Vol. XXV. Part 9.

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NATIONAL MUSEUM OF VICTORIA

The Journal of the Department of Agriculture of Victoria, Australia.

Sept., 1927.

PRINCIPAL CONTENTS

Standard Herd Test—Report for Year 1926-27

Plant Pathology—Studies in Europe and America

Back-yard Poultry Keeping

Lucerne Top-dressing Tests

Preparation of Land for Maize

Hints on Fruit Growing

Sulphuring Dried Fruits—Peaches and Pears

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THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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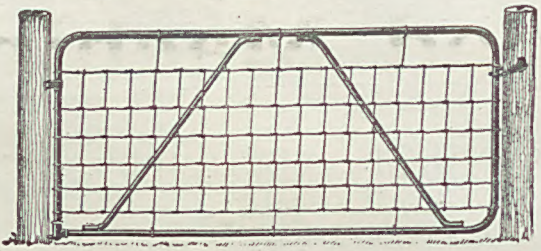

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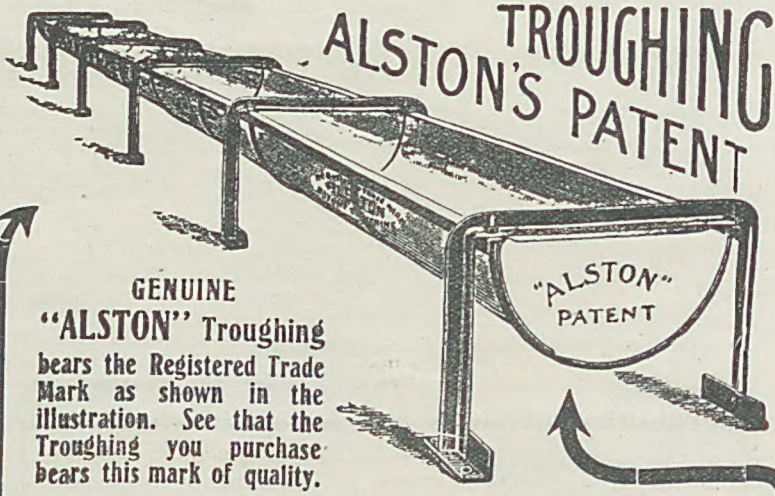

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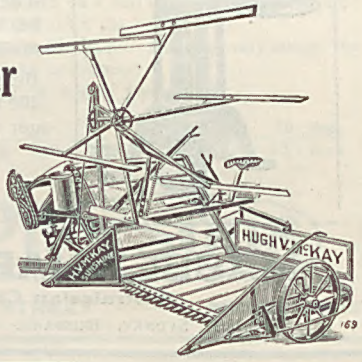

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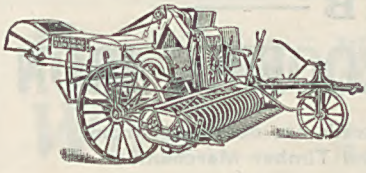

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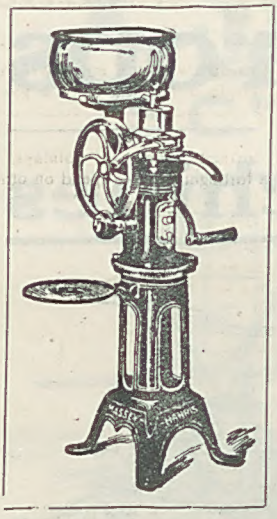

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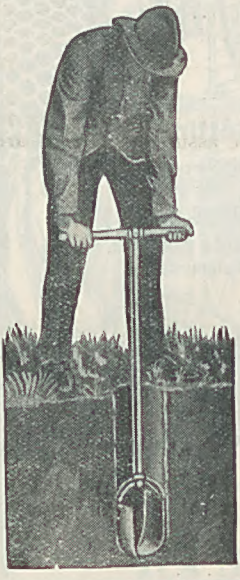

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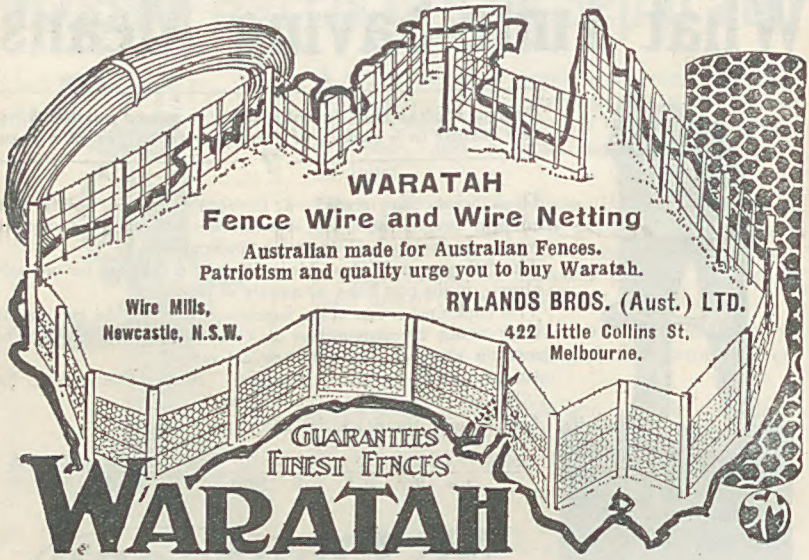

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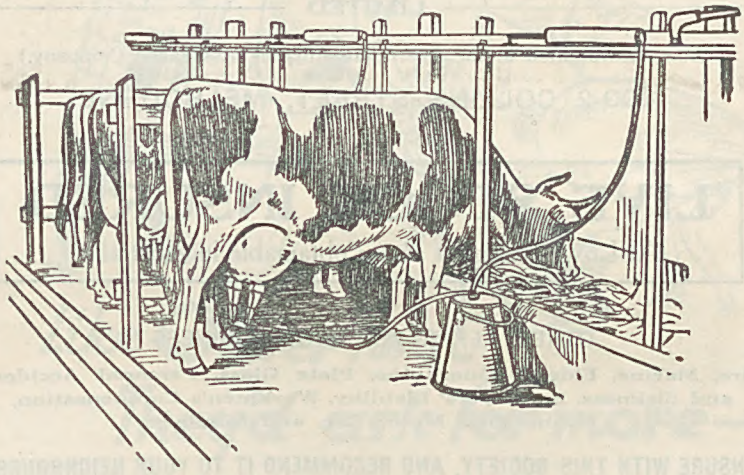

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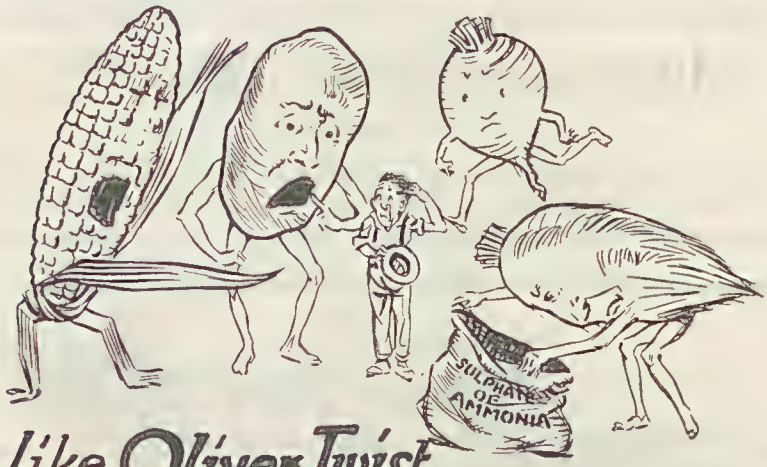

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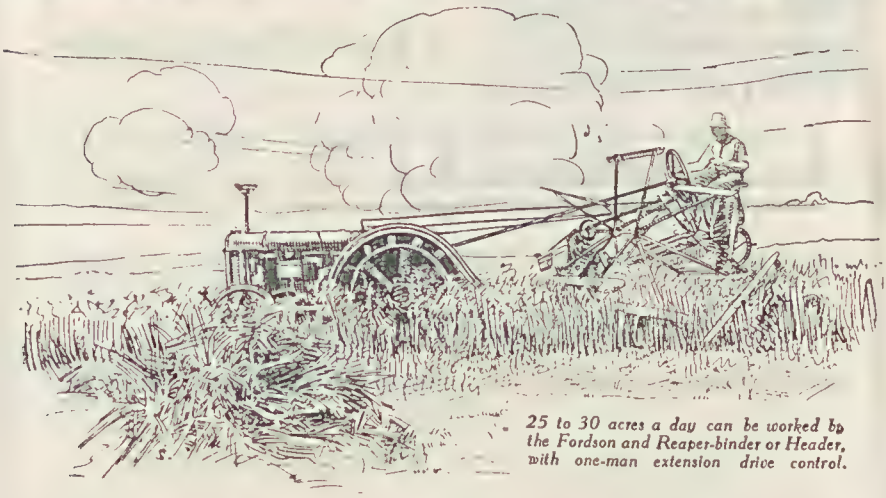

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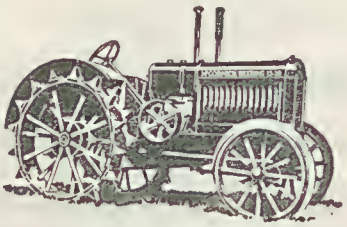

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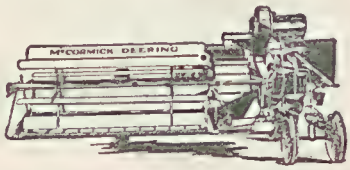
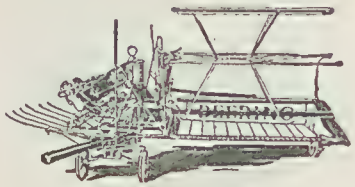


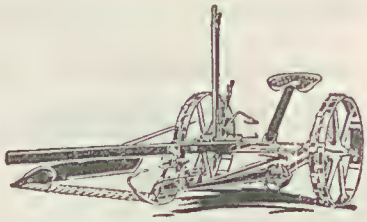
HARVESTER-THRESHERS

The McCormick-Deering Harvester-Thresher is light in draft and easy to operate. A great time and labour saver. Cuts and threshes in one operation and harvests 20 to 40 acres a day. Operates with either horses or tractor.



GRAIN BINDERS

For nearly one hundred years McCormick and Deering Binders have been identified with the farming industry. To-day they are established favorites with farmers in every part of the world. Made in 6 and 8 foot sizes. Also special tractor binder—10 ft. cut.



MOWERS

McCormick and Deering Mowers cut clean. They are light in draft, easy to operate and can be relied upon to give maximum efficiency in all fields. Made in 3½, 4½, 5, and 6-foot sizes.

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REPORT FOR THE YEAR 1926-27.

By A. J. Gill, Senior Herd Tester.

HERD IMPROVEMENT.

A Glance at Early Times.

Important as is the work of crossing different strains of dairy stock, and interesting as it is to watch the development of the progeny, comparatively little thought has been given the subject by the majority of our farmers. However, of late years, a few breeders of pure stock have given some attention to the question. Yet, perhaps, this neglect may not seem so strange when we reflect that it is not much more than eighty years since a beginning was made in the keeping of records of pedigrees and the establishment of Pure-Bred Cattle Associations.

Previous to this, breeding was, as unfortunately it is now in Victoria with 90 per cent. of breeders, simply a matter of mating without any clear idea of the type of animal it was hoped to breed.

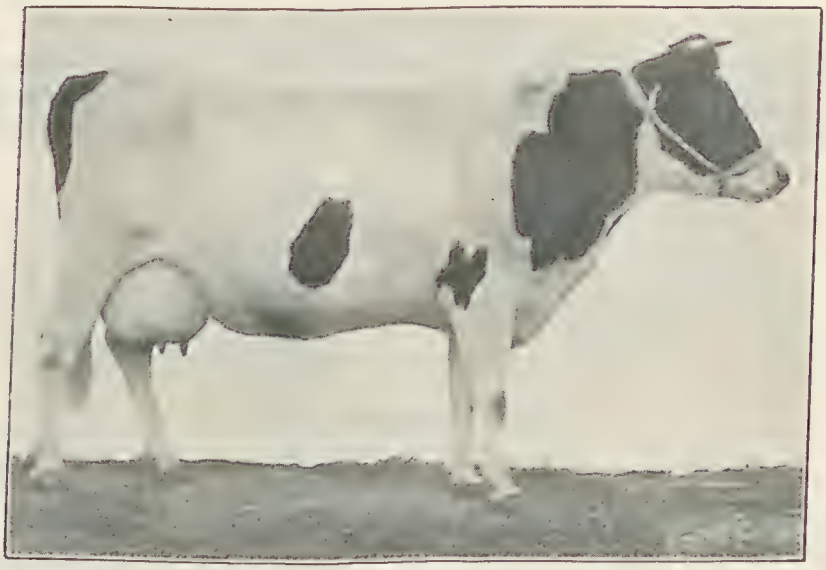
The earliest records in which the cow is referred to date back 3,500 years B.C. These show that even at that early date the cow was valued as the supplier of the ideal food of man. According to records it would appear that the first cows were probably raised in Central Asia, and thence spread to Europe and most parts of the world.

At first, breeding would be by natural selection; the strongest bull would be head of the herd. Size and conformation would, to a large extent, be affected by environment and climatic conditions. Animals living continually on flat fertile land with abundance of food would become large and heavy; those in rugged mountainous country where pasture was scarce and the seasons severe, would develop into small

hardy agile cattle, and in regions where the winters were long and of low temperatures, would grow long heavy coats of hair.

Food and environment will produce a great change in the conformation of any breed of animals in a few years. I have known young milking shorthorn cattle that were turned out on the mountains where pasture was rather scanty, grow to only about three-fourths of the size of those reared on well-grassed flats, a few miles away.

The cow was the companion of our far-off ancestors in their migrations, carrying their burdens, providing them with food, and when permanent settlements were formed, cattle were of use in tilling the soil.



The Champion Cow.

Bainfield Netherland Sylvia 2nd.

Owner—Mr. O. J. Syme, Macedon.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1925–26	12,456	3·69	459·34
1926–27	20,531	3·63	746·02

The three points on which, in these early times, a cow would be judged, would be fitness for the yoke, ability to produce milk, the value of the carcass for beef when killed. No doubt men had different ideas as to colour and conformation. Whims and fashions, as well as environment, were the chief factors that helped to mould the different breeds. When food was required, naturally the animals not conforming to the owner's ideals would be slaughtered, and so gradually certain traits would be eliminated.

Even when different breeds were evolved, probably the absence of fences made it almost impossible to prevent interbreeding, and thus the progress towards improvement was retarded.

The First Conscious Effort to Improve Dairy Cows.

When men commenced to form Breed Associations, the first great foundation was laid down for stock improvement. From that time they were working along defined lines and having a definite object in view, improvement was rapid.

Every stock-owner, if he is to accomplish anything in the way of breeding, must have a definite ideal to work for. An engineer setting out to build a bridge, or a carpenter to erect a house, must first of all carefully prepare the design. He must have in mind the lines on

Westmere Oakwood Piebe. **Westmere Oakwood Duchess.**

(For record see page 517.)

Owner—Mr. J. Plattfuss, Tongala.

Record of Westmere Oakwood Duchess. (Born 10.11.19.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1921–22	10,319	3·41	351·95
1923–24	9,340	3·42	318·98
1924–25	19,017	3·37	638·43
1925–26	19,429	3·62	702·97
1926–27	21,750	3.76	817·28

which he is to build, and what the work will be like when completed, and just as surely must a stock-breeder plan and prepare and know the kind of animal that he desires.

It was this faculty, undoubtedly, that made the famous Bakewell such a remarkable breeder. He introduced methods up till then untried and new to stock-owners. He worked on the great principle of inheritance that like begets like. His motto was—Breed the Best to the Best. He discovered that by mating closely related animals, certain characteristics could be greatly intensified, and thus rapid improvements were brought about.

Inbreeding and Line-Breeding.

As far as we know, Bakewell was the first to adopt inbreeding and line-breeding. He carried out what is known as progeny tests, and in order to widen his field of investigation, lent bulls to his neighbours.

Inbreeding and line-breeding have been adopted by many breeders of late years. Line-breeding, however, is now the system most favoured by the majority of our successful stock breeders.

Beauty 4th of Somerville.
(Born 7.3.15.)

Owners—Messrs. J. Hutchinson and Sons, Somerville.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1919-20	9,099	5·54	503·99
1920-21	10,536	5·15	543·22
1921-22	10,018	4·74	474·85
1923	10,481	5·27	552·05
1924-25	10,800	5·15	560·15
1925-26	10,797	5·09	549·62
1926-27	12,468	5·72	713·38

Strictly speaking, inbreeding means the isolation of a family so as to avoid the introduction of any outside blood. The term, however, is usually applied to the mating of animals containing over 50 per cent. of the same blood.

Breeders and scientists agree that inbreeding increases the stability of character and prepotency, by reducing the number of ancestors, but tends, if carried to any great extent, to impair constitutional vigour and to lower the vitality.

The limit to which inbreeding may be safely carried will vary in different animals. The fact must be borne in mind that while inbreeding may intensify desired characteristics, it is also capable of intensifying objectionable traits.

Inbreeding with medium or inferior animals is altogether inadvisable. The closest possible inbreeding is the mating of full brother and sister.

Extreme advocates of inbreeding quote wild animals, birds, and insects as examples of the practice continued indiscriminately, and

Mr. J. Plattfuss's Westmere Oakwood Piebe.

(Born 20.11.19.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1922–23	11,620	3·27	380·45
1923–24	18,941	2·88	544·54
1924–25	21,786	2·92	635·71
1925–26	24,787	2·93	726·22
1926–27	24,415	2·86	699·24

frequently instance bees. The former bee expert of the Department, Mr. Beuhne, at one time discovered that the queens from certain hives of black bees, three miles distant from his farm, with a mountain range between, were fertilized by his Italian drones. Mr. Beuhne was certain there could have been no mistake, as there were no other Italian bees within twenty miles. Queen bees prefer drones from strange hives. It may be equally true that wild animals and birds prefer to mate with a strange partner, and probably there is not nearly as much inbreeding as some people imagine. But even if there were, the relentness law of

the survival of the fittest culls the wild animals so drastically that none but the best may propagate their species.

Out-crossing, that is the mating of unrelated animals, is a practice formerly followed by a large number of farmers. They believed in using a bull for a couple of seasons and then obtaining another unrelated bull. This custom was responsible for sending many first-class sires to the abattoirs before their value became known. Cases of this kind have tended to make the farmer careful, and quite a number now refrain from selling a bull until his heifers have been tried. Further, if the progeny of a bull are found to be good milkers, then the owner will, if for any reason compelled to dispose of the bull, use in his stead one of the same family. This is really line-breeding.

Line-breeding is the mating of animals of the same family, but not animals so closely related as are mated in what is known as in-breeding. The mating of animals containing 50 per cent. similar blood

Ayrshire Bull—Poppy's Advance of Ben Kell.

Owner—Mr. A. W. Gorman, Alexandra.

The dam was a Royal Show Champion. Her record for 1924–25 was:—Milk, 12,879; test, 5·37; fat, 692·23.

or under is termed line-breeding—for instance, mating cousins, half-brother and half-sister, &c.

The majority of our leading breeders have adopted line-breeding. It is at the present time the most popular method, and appears to be giving the best results.

Good breeders choose an animal with the characteristics they desire, and commence to build on that foundation. Thus, breeding with related stock, they set out to fix and intensify the desired characteristic.

They know what they want and aim at that standard. Some breeders seem to possess a peculiar faculty that might be almost termed instinct in choosing the correct sires. Some of the leading breeders have kindly given me their views on breeding, trusting that they may prove helpful to others. One of them says—"Many people are afraid

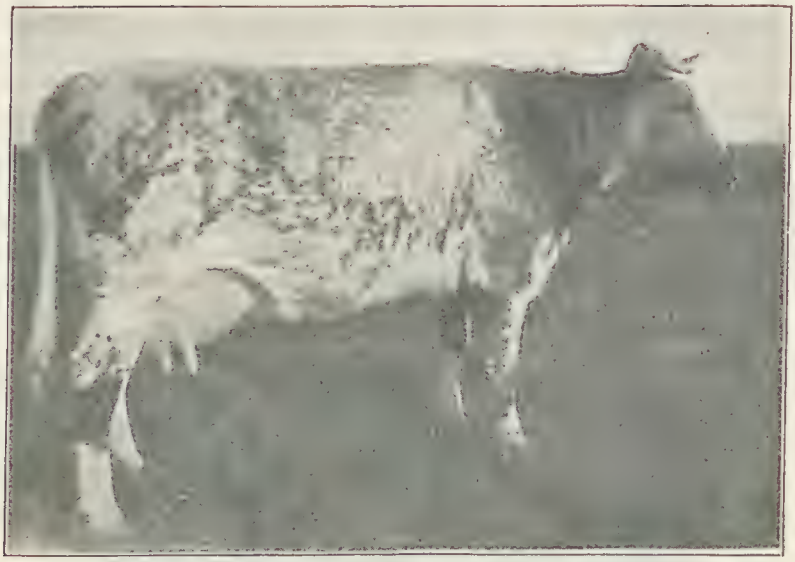
of close breeding and of using related sires. They are continually chopping and changing, and this is why they are not making headway." To this man's mind introducing a new strain of blood is almost equivalent to a cross. When choosing a bull he first of all looks for one with a good constitution, and all sires used must be of the same blood line as that of the previous sires. If the female progeny be robust the bull will be used on them, but this breeder does not believe in inbreeding more than once in this direction. The mating of half-brother and sisters has given excellent results. For several years he has selected only bulls which are the descendants of a world-famous sire, and has concentrated on that blood. He adds this advice:—Always watch for an animal with a good sound constitution, and place production first rather than correct type.

Halecote Oakleaf Fobes

(Born 1.7.20.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1922–23	8,415	3·55	298·52
1923–24	13,030	4·43	465·81
1924–25	20,199	3·18	642·10
1925–26	19,260	3·60	693·07

Another breeder who has built up a splendid herd favours line-breeding, in some cases inbreeding. "When inbreeding," he says, "always watch for signs of weakening of the constitution." He believes in using a bull on his progeny, and if the progeny shows improvement, uses him again on his grand-daughters. He sometimes mates father and daughter, sometimes son and mother. Different families he thinks give better results when mated on different lines. Some families he keeps separate and in some cases line-breeds between two families. Sometimes a bull is brought in to correct the colour or conformation, and the original sire is then mated with his grand-daughter. All stock are watched carefully and line-breeding or in-breeding is followed as circumstances seem to require. Three or four bulls are always kept for use. This breeder considers it a risk to



Cherry of Willow Park. (9193) Vol. V. M.S.H.B. of Aust.
Owner—Mr. W. K. Atkinson, Swan Hill.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1920–21	8,733	3·72	324·67
1921–22	12.017	3·94	474·06
1922–23	15,880	4·00	635·92
1923–24	15.036	3·97	596·81
1924–25	16,245	3·83	622·69
1925–26	18,076	3·80	686·34

Bainfield No. 40. (Born 9.5.18.)
Owners—Messrs. Flack & Gamble.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1920–21	8,667	3·54	306·68
1921–22	8,548	3·56	304·44
1923–24	11,587	3 50	394·96
1924–25	17,131	3·52	602·72
1925–26	16,836	3·24	546·22
1926–27	20,612	3·10	639·80

introduce a bull with whose breeding one is not familiar for fear of weaknesses which the eye may not be able to detect. His motto is:—When selling a bull, sell a good one. Never sell a bull that you would not use in your own herd, or one that will lower your reputation as a breeder.

Another breeder of pure stock says, "The main points to be considered are good constitution, production, conformation, and temperament," and he lays great stress on the necessity for a good constitution as a basis on which to work. He estimates the life of usefulness which he expects from a bull at about eight years. His stock are in-bred and line-bred, but he says that one cannot be sure sometimes, until after

Dominion Iona.
(Born 11.10.16.)

Owners—Messrs. Flack & Gamble.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1918–19	9,509	3·53	336·12
1919–20	6,583	3·42	224·91
1920–21	12,148	2·94	361·34
1921–22	12,303	3·11	382·17
1923–24	21,864	3·17	693·15
1925–26	20,032	3·23	647·14
1926–27	23,958	3·13	749·47

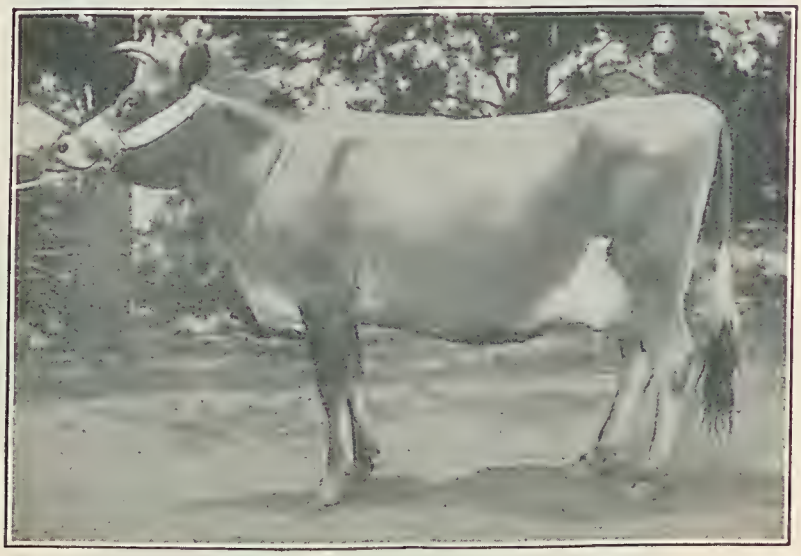
five or six generations, whether the breeding is on the right lines, and he admits that he has had his share of disappointments. He emphasizes the fact that a bull that has proved himself a good sire should be bred from as long as possible, and that bulls should be selected from within the herd, but animals of entirely different conformation should not be mated.

A breeder who has made the raising of dairy cattle a study for years, describes the building up of a herd as a life-long work full of interest and pleasure. The trying out of different strains and systems of mating, and watching the results is to him an engrossing study. Every breeder, he says, should be able to breed his own bulls. New

bulls are sought for improvement, and thus purchasing a sire may indicate that one considers the present sire not up to requirements.

He adopts line-breeding and inbreeding, but does not favour inbreeding to the extent of isolation of a family. His aim is to have not only a herd of producers, but also a herd of fine conformation, pleasing to the eye and also capable of filling the pocket. He contends that the sight of a handsome herd adds in no small way to the enjoyment of one's life and helps towards contentment. This breeder is breeding with a definite object in view, and will undoubtedly succeed.

One cannot draw up "hard and fast" rules as to what animals should be mated. I have consulted many breeders and watched results for several years, but it seems impossible to have a fixed table for



Northern Queen of Somerville.

(Born 28.8.19.)

Owners—Messrs. J. Hutchinson & Sons.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1921–22	6,689	5·03	336·57
1923–24	9,587	4·90	469·33
1924–25	10,275	4·83	496·24
1925–26	10,672	5.49	586·20
1926–27	11,475	5·42	621·56

mating. There is the individuality of the different animals to be considered, and the intelligence of the breeder. His ability to know his stock and their possibilities must play a big part.

The one system that has appeared to me to be most successful is that of the mating of half-brother and sister that are related through the sire.

The table on page 523 is full of interest, and the fact that the records mentioned therein were all established on the same farm by the same feeding methods adds to their value and makes it well worth while studying.

Bluebell 5th of Jerseyholm (Senior 3)
Milk 9046 lb. 6.70 p.c., 605.78 lb. Butter fat

- New Alliance of Jerseyholm
  - Emperor
    - Handsome Boy 3rd of Melrose
      - Pretty Noble
      - Handsome Girl 4th of Melrose
        - Pretty Noble
        - Empire 4th of Melrose (Mature) Milk 8 34 lb 5.61 p.c., 479.13 lb Butter Fat.
    - Empire 5th of Melrose (Mature) Milk 8379 lb. 5.43 p.c., 456 lb Butter Fat.
      - Sweet Fox
      - Lady Grey 4th (Mature) Milk 7250 lb. 5.76 p.c., 417.78 lb. Butter Fat.
    - Lady Marge of Jerseyholm (Mature) Milk 8050 lb. 6.37 p.c., 505.33 lb. Butter Fat.
      - Sweet Fox 2nd
      - Sweet Fox
      - Lady Marge 3rd (Junior 3) Milk 5197 lb. 6.42 p.c., 333.66 lb. Butter Fat.
    - Lady Marge 4th (Mature) Milk 6294 lb. 6.30 p.c., 396.40 lb. Butter Fat.
      - Pretty Noble
      - Handsome Girl 4th of Melrose
  - Emperor
    - Handsome Boy 3rd of Melrose
      - Pretty Noble
      - Handsome Girl 4th of Melrose
        - Pretty Noble
        - Empire 4th of Melrose (Mature) Milk 8534 lb. 5 61 p.c., 479.13 lb. Butter Fat.
    - Empire 5th of Melrose (Mature) Milk 8379 lb. 5.43 p.c., 456 lb. Butter Fat.
      - Hero of Oaklands
      - Wilful Venture Milk 7429 lb. 6.46 p.c., 479 lb. Butter Fat.
    - Bluebell 3rd of Jerseyholm (Mature) Milk 9071 lb. 6.13 p.c., 555.80 lb. Butter Fat.
      - Venture's Hero
      - Starbrights Carnation Fox
    - Bluebell of Jerseyholm (Mature) Milk 7380 lb. 5.92 p.c., 437.22 lb. Butter Fat.
      - Bluebell of Pine Hills (Junior 4) Milk 6759 lb. 5.88 p.c., 397.45 lb. Butter Fat.
      - Canary 13th

Bluebell 5th of Jerseyholm yielded 605.78 lb. of butter-fat on her second calf. She was the result of mating half-brother and half-sister sired by Emperor, which was also the progeny of half-brother and half-sister, both sire and dam being sired by Pretty Noble. Lady Marge of Jerseyholm is also the result of breeding on the same lines; her sire and dam were both the progeny of Sweet Fox. Emperor mated with Lady Marge of Jerseyholm produced New Alliance, which sired Bluebell 5th when mated with his half-sister.

Glancing at the pedigree of New Alliance one sees that the high testing qualities transmitted from Lady Marge 3rd (6.4 per cent.) to her daughter, Sweet Fox, raised the quantity of milk, but the test fell

Mr. Gordon Lyon's Jersey Bull Air Lord.

His dam was Molly 6th of Banyule, a Royal Show Champion. Her record for 1923–24 was:—Milk, 12,497; test, 4·91; fat, 613·36.

only .1. Again, in the next mating, Sweet Fox 2nd increased the production by 176 gallons and the test fell only by .03.

On the other side in the pedigree of Bluebell the 3rd, Wilful Venture has a test of 6.46. Her son mated with Bluebell of Pinehill raised the milk flow by 83 gallons and the test slightly. In the next generation both test and production rose. Bluebell of Jerseyholm (butter-fat 555.8 lb.; test 6.13) mated with New Alliance (whose dam yielded 505.32 lb. butter-fat; test 6.27) produced a cow that tested 6.7 and yielded 605.78 lb. butter-fat.

Future of Dairying Dependent on Breeding High-Producing Cows.

The fate of our dairying industry hinges on the skill of the breeders of pure-bred stock who are testing their cows, and laying the foundations of sires. Their success depends on their skill and the ideal which

Mr. J. Plattfuss's Tarrawarra 56.

(Born —.5.19.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1925–26	19,285	3·05	588·36
1926–27	21,582	2·97	641·57

Miss Guy of Tarnpirr.

(Born 6.3.20.)

Owner—Mr. F. Trevaskis.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1922–23	7,422	6·08	451·54
1923–24	8,269	5·90	487·61
1924–25	8,515	5·96	507·81
1925–26	9,468	5·95	563·62
1926–27	9,554	6·32	603·51

they have in their minds. Breeders who are testing and building up high-producing herds are doing a work of national importance—a work that in a few years will mean millions of pounds sterling to our State.

Beyond doubt heavy producing qualities are hereditary, and when we mate the progeny of high-producing cows, that quality becomes intensified. Skilful breeding does not necessarily create new traits; it selects and concentrates and so intensifies. Testing has made it possible to segregate high-producing blood, and there is reason to believe that by selecting we shall have before long the perfect high-producing animals that will breed true for high production. But we will not

Mr. O. Syme's Banfield Topsy 13th.

(Born 30.8.20.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1924–25	14,455	4·10	593·29
1925–26	16,072	3·88	624·11

accomplish this without the continual use of the tester which enables the low-producing families to be discerned. The successful breeder is the man who eliminates from his herd all undesirable factors. The aim of breeders should be to possess a herd in which there are no inferior animals and one that is incapable of producing inferior animals.

Naturally the more closely related the ancestry the less the variation in stock. Of course, some variation will always remain; that is one of nature's decrees. If a standard could be permanently fixed we would never be able to effect an improvement. The variation is to us the means by which we advance. The skilful breeder notes the variation under different conditions and uses it to his advantage.

One point perhaps worth mentioning is that some stock-owners when advised to cull out a cow that has proved worthless, will agree that it is a wise thing to do, yet because a fair price has been paid for her, they will retain her in the hope that her daughters will give a better account of themselves. And, of course, it may happen that, with a good sire, the daughters will be superior to her dam. But even with good sires there will always be a certain percentage of disappointing results, and if one happens to purchase a bull bred on the same lines as the herd, the tendency to revert to the useless cow becomes much stronger.

Mr. O. Syme's Bolobek Anne.

(Born 12.11.18.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1921-22	9,377	3·82	357·84
1922-23	10,270	3·68	377·92
1923-24	12,568	3·64	457 11
1924-25	13,905	3·75	521·95
1925-26	16,185	3·73	603·81
1926-27	17,027	3·53	601·13

It is difficult to build up reliable strains from foundations of this sort, and the wisest plan is to cull the duffer as soon as she is discovered.

The Control of Sex.

A point much discussed is the control of sex, and a number of stock-owners are experimenting along certain lines. Some breeders hold that nature breeds male and female alternately; if a bull calf is born this year they say that next year if the dam be served when she first

Messrs. Flack & Gamble's Springfield del Kol. (Born 1.10.18.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1920–21	8,504	4·17	354·62
1921–22	8,484	4·59	389 32
1922–23	10,303	3·97	407·52
1923–24	17,811	3·74	665·54
1924–25	17,353	3·83	665·05
1925–26	15,270	3·99	609·77

Mr. Gordon Lyon's Molly 8th of Banyule. (Born 25.9.19.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1922	5,516	5·50	303·53
1923	7,978	5·68	452·89
1924	9,886	5·44	538·14
1925	10.857	5·87	637·11
1926	12,019	5·03	605·10

comes on season a heifer will be born; but if not served till she comes on season a second time a bull will result, while if not served until she comes on season a third time the calf will be a female, and so on.

Others hold the idea that if a bull is in low condition and the cows in good condition the sex of the cow will usually prevail, and that in such circumstances the majority of the calves will be heifers.

Certain cows produce a preponderant number of one sex, and the peculiarity is at times noticeable in their daughters. If this apparent hereditary influence were established beyond doubt it would appear to indicate that the sex is determined by a law which may be influenced by the constitution and rate of metabolism.

Messrs. Flack & Gamble's Burnbank Alcartra King.

His dam, Dominion Queen Mercedes, was a Royal Show Champion. In one season she yielded 720 lb. butter fat.

That interesting writer Louis J. Bonhote raises the point of the sex of the offspring being influenced by the vigour of the parent and instances the case of a pair of wild rats which he had taken to England from Egypt in the early spring when the weather was cold and not conducive to high vigour. Their brood was a backward one, seven in number, and all males. This pair did not breed again, but other rats breeding later in the season, when the weather was warmer, produced broods of which the sexes were fairly equally numbered.

Again, in breeding pigeons, when only one egg is laid it may be taken as a sign of low vitality and in almost every case the bird hatched from this egg will be a male. When two are laid they will almost certainly produce one male and one female. A brood of two females would be unusual except in an early nest, while a brood of two males would suggest that they were from a late-season nest when the vitality of the parents has been lowered by the strain of breeding. These happenings may possibly suggest that high vitality is conducive to the breeding of an abnormal number of females and low vitality to an abnormal number of males.

That vitality may have some effect in determining sex is further suggested by the seeming fact that in the group of animals kept in confinement, there is a prepondenance of males.

A bull kept without exercise becomes, at an early age, fat and sluggish, and perhaps impotent, while if allowed to roam in large paddocks he will retain his full vigour till he is twelve or thirteen years old.

It may be that what is known as metabolism, i.e., the changes continually going on in living cells, may exert some control over the sex. We see its influence in the colour of animals of different climates. In

Mr. F. Raggatt's Goldy of Strathbow.

(Born 23.4.18.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1920–21	5,006	6·35	317·94
1921–22	6,293	6·26	393·94
1922–23	7,516	5·90	443·33
1924–25	9,786	5·86	574·25
1925–26	11,115	6·01	668·52
1926–27	9,806	6·24	612·13

animals of the cold regions where metabolism is slow their colours are subdued compared with those of animals living in tropical countries.

The brighter colour of some birds at breeding times shows the effect of a higher rate of metabolism and increased vitality. Again, as age increases loss of vitality is marked by the whitening and loss of hair.

We have numerous interesting works on breeding, but so far many of its laws are unsolved. A breeder's success will depend on his ability to select. He must have a definite object in view. Each individual is made up of various characters, and, as far as practicable, the most desirable must be selected.

Messrs. J. E. Handbury & Sons' Lassie of Strathbow.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1923	4,666	5·09	237·43
1924	7,482	5·45	407·74
1925	6,262	5·53	346·27
1927	11,151	5·47	610·35

Messrs. Flack and Gamble's Burnbank Bainfield Patch.

(Born 6.4.21.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1923–24	9,974	3·91	390·05
1924–25	15,591	3·81	606·75
1925–26	17,060	3·56	608·14

How the Industry could be Advanced.

The wise breeder must plan for the future. When the demand is keen, indifferent animals will sell, but as the number of high-producing stock increases, only the best animals will command the highest prices.

Our breeders have many difficulties to surmount. Much good would result if they were to hold annual meetings to talk over the different problems that arise and the results of their different experiments. Discussions of this kind would undoubtedly assist in solving some of the troubles, and would be helpful to experienced as well as young breeders. It would, perhaps, also suggest to some the desirableness of keeping records of their experiments and working along definite lines toward an objective.

Messrs. Smith and Sons' Halecote Opera Girl.

(Born 8.8.22.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1924–25	12,484	3·27	408·28
1926	18,940	3·43	649·96

The cow is destined to become the principal source of animal food. In the first place no animal can produce food as cheaply, and secondly no other food is as valuable as that produced by the cow.

Dairy products are indispensible as articles of food. We cannot rear healthy children without a good supply of milk.

As civilization increases, the necessity will become more apparent for the health of nations will be built up on the production of their dairy cows.

Another point that must be taken into consideration besides heavy production is economical production. Some cows have the ability to produce at a lower cost than others. True, methodical feeding will

Harebell of Springhurst.

(Born 13.3.22.)

Owners—Messrs. D. Cameron and Sons.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1924–25	7,851	5·94	466·71
1925–26	8,419	5·98	503·18
1926–27	9,678	6·16	596·57

Mr. T. Harvey's Bluebell 5th of Jerseyholm.

(Born 29.10.22.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1924–25	5,799	6·15	356·83
1926	9,036	6·70	605·78

do much to reduce the cost of production. As every dairy farmer knows, some cows will produce more economically than others; they have the ability to turn food into milk at a lower cost, and so show greater profit. It is the building up of herds composed of such cows that must be striven for. We have made much headway since the testing scheme was first launched, but we hope to see still greater improvement during the next decade.

A Couple of Obscure Questions.

A feature of interest that is becoming noticeable is the frequency with which our champion cows have given birth to twins. There seems

Yorkshire Rosevale Ideal.

(Born 17.7.22.)

Owner—Mr. J. Plattfuss, Tongala.

Season.	Milk. lb.	Test.	Butter-fat. lb.
1925	13,587	3·67	498·34
1925–26	14,411	3 83	552·50
1926–27	17,513	3·61	631·54

to be some connexion between high production and twin calves. Is nature in some remarkable way providing for the extra milk supply, and will the birth of twins become commoner in the future?

A question one hears discussed frequently is: Will a heifer's first calf be as good as one from a fully matured cow? The answers to the question vary. But, provided a heifer has matured according to age and is well nourished and is not served at too early an age, there is no reason why her calf should not at least be equal to that of a matured cow, especially one from a cow that has undergone a strain in producing milk for some years. Here are two examples. Babs of Somerville,

the champion Jersey cow of Australia, which produced 843 lb. of butter-fat in nine months, was born when her mother was one year seven months of age. Greenvale Dolly 3rd, which produced 515 lb. of butter-fat as a two-year old, was the first calf of a mother just under two years and three months.

What is a "Grade" Cow.

The meaning of the term "grade" as applied to cows is often misunderstood. A grade animal is one that contains 75 per cent. pure blood. For instance, an Ayrshire bull on an ordinary cow or one of another breed will beget a half-breed Ayrshire. The half-bred females mated again to an Ayrshire will produce grade Ayrshire; by continually breeding toward Ayrshire they would eventually become practically pure-bred Ayrshire. This is what we mean when we speak of grading up a herd.

Mr. P. J. Maloney's Peggy of Belgonia.
(Born 1.11.23.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1925-26	8,044	5·22	420·07
1926-27	9,974	5·27	525·35

Comments on the 1926-27 Test.

The result of this year's work of the Standard Herd Test is very satisfactory. Severe drought conditions prevailed at the end of the summer and during the autumn, and caused much uneasiness. The results, however, constitute a record for high yields.

Seventy-five cows have passed the 500-lb. standard including one with over 800 lb., three over 700, and fifteen over 600, while the average yield of four herds has exceeded the 500-lb. average. This is indeed gratifying, and breeders are becoming more enthusiastic. What they are doing for the State will be realized when the value of our dairying industry has increased twofold. When bulls from these tested cows go into the farmer's herds throughout the State, 160 lb. per cow will not long remain the average, and it will be seen how wise was the expenditure on the development of the Standard Herd Test.

New Herds for the 1927-28 Test.

The large number of entries received this year evinces a growing keenness.

The new breeders entering were—

Burnbank Cheese Coy., Dhurringhill.—Friesian.
S. Bolton, Mannerin.—Jersey.
J. Charlton, Stony Creek.—Jersey.
W. J. Colman, Kerang.—Jersey.
T. S. Dowson, Hicksborough, via Wonthaggi.—Jersey.
A. E. Enders, Stanhope.—Friesian.
N. H. Enders, Stanhope.—Jersey.
A. Evans, Heywood.—Jersey.
A. J. Eldridge, Noorat.—Friesian.
J. M. Foster, Somerville.—Friesian.
A. T. N. Facey, Epping.—Ayrshire.
O. Gepp, Macleod.—Jersey.
N. Gange, Mininera.—Ayrshire.
D. Harker, Caldermeade.—Ayrshire.
P. C. Mc. Hutchinson, Merino.—Jersey.
H. W. King, Gormandale.—Jersey.
A. J. Mapleson, Jindivick.—Jersey.
H. V. McLeod, Tyrendarra, via Portland.—Jersey.
K. McWhae, Merino.—Guernsey.
A. C. Overend, Sale.—Jersey.
W. H. Olney, Caldermeade.—Ayrshire.
Mrs. A. Poole, Caldermeade.—Ayrshire.
Pinkerton Bros., Kongwak.—Ayrshire.
I. Padgett, Werribee.—Friesian.
W. Regnier, Poowong.—Friesian.
C. N. Runciman, Murraydale.—Jersey.
J. B. Roberts, Gonn's Crossing.—Jersey.
H. A. Schier, Rochester.—Jersey.
M. V. Stephens, Tongala.—Jersey.
C. L. V. Sharp, Murrabit.—Friesian.
G. Taylor, Caldermeade.—Ayrshire.
J. V. M. Wood, Heidelberg.—Jersey.
K. C. H. Young, Murrabit West.—Ayrshire.
S. H. Webb, Neerim North.—Jersey.

TABLE SHOWING YIELDS OF THE BEST COWS IN EACH YEAR'S STANDARD HERD TEST SINCE ITS COMMENCEMENT.

Year.	Best Cow over 4 Years old.	Best Cow Between 3 and 4 Years.	Best Heifer Under 3 Years.
	Lb. Butter-fat.	Lb. Butter-fat.	Lb. Butter-fat.
1913	388	311	256
1914	585	409	376
1915	706	499	446
1916	523	439	347
1917	542	425	347
1918	518	441	410
1919	577	519	494
1920	718	512	450
1921	581	582	427
1922	647	497	527
1923	616	524	486
1924	720	578	425
1925	843	563	514
1926	726	607	588
1927	817	746	525

HERDS IN ORDER OF MERIT.

Order.	Owner.	Breed.	Heifers.		Post Heifers.		Mature Cows.		Total No. Cows in Herd.	Average without Allowances.	Average with Allowances.
			No.	Average Butter-fat.	No.	Average Butter-fat.	No.	Average Butter-fat.			
				lb.		lb.		lb.		lb.	lb.
1	Flack and Gamble ..	Friesian..	2	364·49	1	402·57	13	540·91	16	510·21	530·71
2	P. J. Maloney ..	Jersey ..	0	..	3	466·18	8	517·41	11	503·44	522·57
3	Trevor Harvey ..	,, ..	1	304·12	3	488·14	7	515·42	11	488·77	514·73
4	O. J. Syme ..	Friesian..	4	349·25	5	495·37	8	521 32	17	473 20	514·05
5	J. Plattfuss ..	,, ..	3	326·02	3	438·43	8	500·63	14	449·88	483·67
6	A. A. Broad ..	Jersey ..	3	397 66	3	425·05	5	479·30	11	442·24	481·83
7	Gordon Lyon ..	,, ..	8	367·03	5	436 69	10	409·49	23	419 80	468·25
8	T. Mesley	,, ..	3	308·50	4	461·83	4	466·35	11	421·66	465·79
9	J. D. Read ..	,, ..	7	321·48	10	380·79	6	493·78	23	392·22	448·28
10	R. Maher	,, ..	1	316·98	2	317·06	9	459·69	12	424·03	444·61
11	F. Trevaskis ..	,, ..	5	341·25	5	381·81	4	416·56	14	377·26	428·90
12	W. H. Atherton ..	,, ..	3	358·92	1	251·82	7	418·20	11	386·90	417·40
13	J. E. Handbury and Sons	,, ..	3	272·06	..	..	7	443·73	10	392·53	415·03
14	W. K. Atkinson ..	Milking Shorthorn	11	292·96	4	295·84	14	428·57	29	358·82	408·67
15	E. H. Howlett ..	Jersey ..	4	288·56	4	362·41	4	419·44	12	356·81	404·47
16	J. H. Huffer ..	,, ..	5	317·20	3	374·48	3	381·28	11	359·30	403·53
17	J. Anderson, junr. ..	,, ..	6	302·75	1	343·76	7	401·78	14	355·20	397·91
18	Gibson Bros. ..	,, ..	5	313·52	1	307·49	6	389 19	12	350·85	391·85
19	F. Bidgood ..	,, ..	4	279·05	3	345·72	5	395·95	12	344·43	387·93
20	Simpson and Son ..	,, ..	2	261·40	3	293·83	12	392·35	17	359·55	385·70
21	W. Woodmason ..	,, ..	10	248 24	10	330·58	10	383·95	30	321·11	377·78
22	G. Esler	,, ..	4	311 29	..	..	6	366·71	10	344 54	374·54
23	Cockbill Bros. ..	Ayrshire	6	319·31	5	297·54	5	349·90	16	322·07	373·82
24	Aveley Stud Farm ..	Jersey ..	6	245·27	10	306·75	10	379·82	26	320·66	370 20
25	C. D. Lloyd	,, ..	4	267·07	2	306·26	6	379·43	12	329·78	369·12
26	J. T. Tweddle ..	Friesian	4	309·81	4	227·27	6	401·47	14	325·50	368·22
27	Department of Agriculture	Red Poll	6	259·35	6	341·98	13	347·23	25	324·88	367·38
28	F. Austin	Jersey ..	5	246·03	5	323·10	9	362·32	19	321·40	363·79
29	Mrs. I. Beard ..	,, ..	3	251·97	5	306·08	7	365·69	15	323·07	362·24
30	N. C. De La Rue ..	,, ..	3	310 00	3	304·78	4	344·53	10	322·25	359·75
31	H. Allez	Friesian..	9	270·27	2	322·51	7	336·30	18	301·75	353·81
32	N. L. Webb ..	Ayrshire	3	255·85	2	214·56	10	366·57	15	324·16	352·59
33	W. Parbury ..	Jersey ..	3	308·68	6	304·38	10	322·23	19	314·45	351·59
34	Miss S. L. Robinson	,, ..	4	261·88	2	320·79	9	326·95	15	308·77	342·94
35	G. Gange	Ayrshire	1	230·02	4	281·23	8	340·97	13	314·06	341·71
36	W. Henderson (Home Farm)	,,	1	298·01	4	330·86	10	311·29	17	..	..
37	A. W. Gorman ..	,,	3	228·39	4	295·54	4	322·12	11	286·89	331·03
38	D. Ralston ..	,,	3	186·18	4	330·86	10	311·29	17	293·81	327·31
39	Dookie Agricultural College	,,	2	158 54	3	231·06	5	343·43	10	272·74	302·74
40	Geelong Harbour Trust	,,	13	218·80	5	264·11	15	307·65	33	266·05	318·92

Special Herd Testing Prizes.

This year the champion herd award goes to Messrs. Flack and Gamble's Friesian herd, Berwick. The average per cow including handicap allowance was 530.71 lb. of butter-fat.

The second prize herd is owned by Mr. P. J. Maloney of Tongala. The average yield including allowances was 522.57 lb. of butter-fat.

Some members of the winning herd were milked three times daily. The cows in the second herd were milked twice daily.

The champion prize for highest yielding cow recalving within fifteen months goes to Mr. D. Syme, Macedon, whose cow Bainfield Netherland Sylvia 2nd yielded 746.02 lb. of butter-fat.

The reserve champion prize was awarded Beauty 4th of Somerville; her yield was 713.38.

The winning cow was milked three times daily; the second cow twice.

The leading cows in the various sections are—

Mature class—

Westmere Oakwood Duchess.—Friesian, 817.28 lb. butter-fat.

Senior 4, Lassie of Strathbow.—Jersey, 610.35 lb. butter-fat.

Junior 4, Harebell of Springhurst.—Jersey, 596.57 lb. butter-fat.

Senior 3, Bainfield Netherland Sylvia 2nd.—Friesian, 746.02 lb. butter-fat.

Junior 3, Yorkshire Rosevale Ideal.—Friesian, 552.50 lb. butter-fat.

Senior 2, Peggy of Belgonia.—Jersey, 525.35 lb. butter-fat.

Junior 2, Daffodil of Grangelea.—Jersey, 433.41 lb. butter-fat.

Special Herd Testing Prizes.

Champion Herd. Prize, £20.

Reserve Champion Herd. Prize, £10.

To be awarded to the herds giving the greatest and second greatest average under the herd testing regulations of the Department of Agriculture during the year ending 30th June.

Minimum number of cows competing in the test during the year, ten.

Such herd to average 300 lb. of butter-fat.

Handicaps to be allowed on the following scale:—

In a herd of more than ten, each cow shall receive an allowance equivalent to ½ lb. of butter-fat for each cow in the herd.

Cows commencing their first lactation period, being then under three years of age, shall receive an allowance of 75 lb. of butter-fat.

Cows commencing their first lactation period and being then over three years, and cows commencing their second lactation period and being under four years of age, to receive an allowance of 50 lb. of butter-fat.

Champion herd prize, won by Flack and Gamble's Friesian herd, Berwick.

Reserve champion prize, won by P. J. Maloney's Jersey herd, Tongala.

Grand Champion Cow under Herd Testing Regulations.—A grand champion prize of £100 to be awarded to the cow securing the position of annual champion cow for three years, not necessarily in succession. Not yet allotted.

Annual Champion Cow under Herd Testing Regulations.—A prize of £10 to be awarded to the cow which on completion of the lactation period gives the greatest amount of butter-fat under the herd testing regulations of the Department of Agriculture during a lactation period terminating within the year ending on the 30th June, and re-calving again within fifteen months from previous calving date. If two lactations are completed within the year the last will be considered.

Won by Bainfield Netherland Sylvia 2nd.

Annual Reserve Champion Cow under Testing Regulations.—A prize of £5 per annum to be awarded to the cow attaining second place under the herd testing regulations of the Department of Agriculture during the year ending 30th June. The cow calving again within fifteen months from previous calving date.

Won by Beauty 4th of Somerville.

In computing the average yields of cows in herds competing for the champion herd prize next year. The allowances in regard to age will be according to the standards required by the standard herd test regulations, consequently the allowances will be as follows:—

Junior 2-year olds ..	..	150 lb. butter-fat.
Senior 2-year olds ..	..	125 lb. „
Junior 3-year olds ..	..	100 lb. „
Senior 3-year olds ..	..	75 lb. „
Junior 4-year olds ..	..	50 lb. „
Senior 4-year olds ..	..	25 lb. „

Mr. A. A. Broad's Daffodil of Grangelea.

(Born 23.10.24.)

Season.	Milk. lb.	Test.	Butter-fat. lb.
1926-27	7,697	5·63	433·41

Owing to pressure of space in the *Journal* the usual list setting out in order of merit the names of all the cows competing in the 1926-27 test is being published as a supplement.

This supplement together with the usual list of competing herds, grouped alphabetically according to owner's name will be reprinted in pamphlet form, and, as in past years, free copies will be available for those applying for them.

PLANT PATHOLOGY.

(6) American Research Institutions.

STUDIES IN EUROPE AND AMERICA.*

(Continued from page 366.)

By D. B. Adam, B.Ag.Sc., Plant Pathologist.

The Citrus Experiment Station at Riverside, Cal., and the Hawaiian Sugar Planters' Association.

Riverside, like Mildura, with its handsome buildings, its palm-lined streets and general prosperity, is a living example of the wonderful change that an ample water supply can bring about.

The Experiment Station, among rich, green, flourishing citrus trees, lying at the foot of bare granite hills, shows further how complete is this triumph of man over his circumstances.

At this station, improvement of citrus culture is sought both through the suppression of diseases and pests, whether caused by fungi, insects, or unfavorable conditions of climate and soil, and by the improvement of the trees themselves.

The station is connected with the University of California, and is renowned for its staff, many of whom have world-wide reputations. Unfortunately, during my visit, Dr. H. S. Fawcett, a noted authority on citrus diseases, was away attending a conference of plant pathologists in the Eastern States.

Combating the Diseases of Citrus Trees.

Dr. Fawcett and his co-workers have done a lot of work on bark diseases of citrus, including collar rot gummosis (*Pythiacystis*), which in parts of California, as in Victoria, is probably the most serious disease of citrus. In a neighbouring grove at Riverside, there was a very fine illustration of the seriousness of this disease, and of the manner in which it can be controlled.

The necessity for control may be realized when it is stated that fully 70 per cent. of the trees were affected by a disease, which, if neglected, would probably render the grove practically useless, certainly unprofitable, in three or four years' time. Keenness in detecting the earliest stages of this disease, and its prompt and thorough treatment are alike essential if losses are to be avoided.

The time to examine and treat trees is during winter. In the early stages, when treatment is so necessary, the health of the tree may not be apparently affected. Disease symptoms appear at the base of the main trunk as dead, brown, slightly sunken, irregular, but generally elongated patches, with a gummy discharge. The patch enlarges, and, killing the bark, cuts off the water supply to the above ground portion, which suffers in consequence.

* This is the concluding section of Mr. Adam's report on investigational work in England, Europe, and United States of America. Previous portions were printed in this *Journal* for January, February, April, May, and June.

The treatment consists in throwing back the wet earth from the base of the tree, and cutting out carefully the diseased part, especially above and below the gummed areas. These treated places and the entire trunk are then painted with Bordeaux paste (1 lb. bluestone and 2 lb. rock lime to 1½ gallons of water), or with a strong Bordeaux-oil emulsion, the use of which is becoming more popular.

An important measure of control is available through the use of sour orange stocks, budded high. Lemons are most susceptible to this disease; sour oranges least susceptible. Australian growers have not taken kindly to sour orange stocks, since trees worked on them make much poorer growth than those on the lemon. However, this disadvantage is set off where the danger from gummosis is considerable. A slower growing tree, which, with care, is resistant to disease, clearly is better than the faster growing tree that runs a considerable risk of being killed after occupying the land for a dozen or fifteen years, especially as the first four or five years of occupation are unprofitable. Where the danger from gummosis disease is less, such as in sandy loam, which has good drainage, sweet orange stocks may be used. Such stocks are more disease-resistant than lemons, and produce freer growing trees than do sour orange stocks.

The securing of a satisfactory combination of sour orange stock and lemon scion is at present one of the problems for which a solution is being sought by the workers at Riverside. After twenty years' experience, growers are finding that the growth activity of the lemon and of the sour orange are so different that a bad union results, and the tree suffers in health. The solution of the problem in the case of an old tree already showing this condition is being attempted by planting a lemon seedling alongside the main trunk, and when it has struck, it is grafted on to the main trunk. This inarching of seedlings is also used where extensive cutting away of bark in the treatment of gummosis has taken place. The whole problem of citrus stocks propagation, effect on scion, is being studied at Riverside in much the same way as is the problem of apple stocks at East Malling, England, mentioned in an earlier report (see this *Journal* for June).

California, like Victoria, has diseases of citrus and other fruit trees, which cannot be assigned to any definite cause such as a fungus or bacteria. Probably the worst disease of this sort is the mottle leaf. In this disease, young leaves, instead of being wholly green and healthy, have irregular yellow areas between the veins, and the leaves drop off and others are produced. The tree becomes excessively twiggy, unthrifty, and produces very poor crops. This disease occurs in parts of our northern citrus-growing areas.

Work at the Riverside station has shown that the trouble is largely influenced by soil conditions. Trees have been grown in solutions of different composition, and in sand watered with different solutions for various periods. The results of experiments, so far, seem to indicate that a "high available" potash: "available" lime ratio, produces mottling symptoms. "Available potash" and "available lime" mean the quantity of each of these substances which plants can utilize in their growth. The terms must be distinguished from total potash or total lime which quantities are determined by the usual means of chemical analysis. The distinction is particularly important in Victoria, since in areas where this disease occurs, total lime is frequently very high.

The problem of setting these trees aright unfortunately does not simply consist in applying "available lime." For certain reasons, lime so added, in many soils, may have the effect of liberating more potash, and so the remedy serves to aggravate the disease. Experiments in applying lime in various forms to overcome this difficulty are being carried out on trees in the experimental orchard. From the orchardists' view-point, most successful results so far have been gained through the use of farmyard manure. The writer saw a very striking example of trees being brought back to productivity by such applications. It is now the practice of growers in the "mottle" leaf sections of California to apply frequent dressings of farmyard manure from the earliest time that the grove is set out. Formerly, as in Victoria, "mottle" leaf would appear in the sixth or seventh year, but now, in many cases, its appearance is put off indefinitely.

Preventing Damage by Frost.

Riverside is sometimes subject to severe frosts, and orchard heaters are part of the equipment of every citrus grove. These heaters burn crude oil. In Victoria, severe frosts are unusual, but this year's experience must have directed growers' attention to the need for considering frost danger when planting their groves. At Riverside, lemons are grown in a definite section, with an easterly aspect, 50 or 60 feet above the floor of the valley. Growers, as far as possible, induce their trees to dormancy, forbear from manuring till the danger of frost is over, and delay pruning till fresh green growth is commencing to come away. Stocks of the trifoliate orange, which is a deciduous tree, may be used where there is a danger of winter killing, but this stock does not do well at Riverside.

Biological Control of Insects.

Southern California and the Hawaiian Islands enjoy a mild climate which, however, has its disadvantages, for insect pests introduced into such countries tend to increase with great rapidity. Further, it often happens in these places that spraying and similar preventive measures are only partially effective, and are expensive to apply.

However, it is under these circumstances that biological control (that is the control of insects by the use of their natural enemies) has produced some excellent results. The sugar-cane leafhopper was introduced to the Hawaiian Islands probably about 1897. In five years the pest had reached calamitous proportions. The yield from one plantation, which formerly was 19,000 tons per annum, fell to 7,000 tons per annum in three years. Spraying would not meet the situation. As the result of a visit of entomologists to Australia, a number of parasites of the leafhopper were introduced, and in two years the depredations had been reduced 25 per cent. Further introductions were made, and so complete was the control, that now it is difficult to find any leafhoppers at all.

Although such success has attended a number of introductions into the Hawaiian Islands, biological control has not always responded to the comparatively simple procedure of introducing the beneficial insect, and allowing it to increase naturally.

An instance of where beneficial insects require assistance to tide them over winter, such as exists in Southern California, is provided by the ladybird insect (*Cryptolaemus*) which attacks the mealy bug of citrus. This aspect of biological control is of especial interest to Victoria, which, like California and unlike the Hawaiian Islands, has a definite winter season. The *Cryptolaemus* was introduced into California quite a long time ago, and at times was able to reduce isolated outbreaks of the citrus mealy bug, but in many outbreaks the parasites have not put in an appearance at all. In other cases the appearance of the natural enemies has come so late in the infestation that great damage has been done to the trees and fruit before control was brought about. Again, it sometimes happens that the beneficial insects, which never themselves feed on plants, starve themselves out by destroying all the insects on which they feed. The result is that if the harmful insect reinfests the grove it rapidly becomes a pest. In view of this possibility, it was considered necessary to devise artificial means for raising these beneficial insects and liberating them at the time when they are most needed.

The State Insectarium, California, U.S.A.

These artificial conditions are produced in specially constructed, heated houses, called insectaria. Potatoes are sprouted in trays to serve as food for the mealy bugs which in turn serve as food for the ladybirds. These ladybirds fortunately rear readily in confinement, and are produced in enormous numbers. Adults are caught and put into glass phials which can be conveniently transported. They are then liberated in groves where most needed. Normally it is impracticable to liberate numbers sufficient to control the pest. The

plan adopted is to release ladybirds at a time when they can deposit their eggs among the eggs of the mealy bug—a natural habit which they have. The mealy bug and its parasite hatch out at the same time, and control is rapidly effected.

There are numbers of these insectaria dotted over Southern California. Although each insectarium requires practically the whole time of one man, the cost of producing these natural enemies (borne for the most part by citrus-growers acting co-operatively) is slight compared with the cost of fumigation, even were fumigation successful.

Californian workers at present are busily engaged in searching for an effective parasite for red scale. Search for effective parasites is, of course, likely to be successful only in countries where the pest originated, and where apparently it is economically unimportant. The actual discovery of such beneficial insects, the study of their habits to ensure their harmlessness, and their freedom from enemies of their own, is a technical matter requiring the services of an expert entomologist equipped to travel in remote parts of the earth, but the results, in their completeness, and their freedom from expense when once established, have in the past justified the initial expense involved.

The Hawaiian Sugar Planters' Association is a private association of planters which supports an experiment station to study the varied problems of sugar-cane growing. The biological control of insects which have so often threatened the prosperity of the industry is perhaps its most spectacular success, but the rearing of H109, a new prolific cane variety, disease-resistant, and of high sugar content, the acreage of which is now over 80,000 acres, and investigations on factory control of operations, are scarcely less valuable contributions from the station.

Possibly the activity there which best shows the broad view of the problems confronting sugar-cane growing is the establishment and development of its Forestry Department. Reafforestation in itself is a commendable and profitable activity when timber possibilities are considered; its relation to sugar-cane growing, however, is less evident.

Despite their tropical location many districts in the Hawaiian Islands have a rainfall much too small to raise profitable crops of sugar cane, and there irrigation plays an important part in increasing yields. In these dry situations a great deal of water is obtained by pumping from artesian wells. Indeed one plantation has capacity for pumping a hundred million gallons daily, equivalent to the quantity used in Melbourne on a hot day. These artesian basins are fed on the windward rainy side of mountain ranges which form the backbone of the islands. It is evidently desirable to catch all the water falling on the mountains rather than let it run off as surface water.

Under natural conditions the roots of forest trees and shrubs and the undergrowth keep the soil porous and receptive, so that water does not run off so readily. On the other hand, when trees are destroyed and the ground exposed, it dries and settles, and much of the rain that falls runs off and is lost. In Victoria we have had such an experience where trees have been thinned out in the catchment basin of a river which, after a heavy but not extreme rain, was fed by excessive surface run off, and was flooded to a greater extent than ever before in its history.

The rainy slopes of Hawaii's ranges have been thinned out, and in part denuded of forest by various means, and it is the job of the Forestry Department to restore this forest to its natural condition with tall trees, intermediate trees, and undergrowth.

Acknowledgment.

I am unable here to acknowledge to individuals the assistance rendered me during my stay in the various countries visited. In every case I received the utmost attention, kindness, and facility for making inquiries, and it is a great pleasure, and brings back many happy remembrances to make this record of my appreciation of the goodwill shown to me.

PROSECUTION UNDER FERTILIZERS ACT 1915.

Manures Under Guaranteed Analyses.

At the Dandenong Police Court on Monday, 15th August, 1927, the Victor Plant Food and Gardening Company of Dandenong was fined £7 with £8 8s. costs on each of two charges relating to offences under the Fertilizers Act.

The case was heard by Mr. Freeman, P.M.

Mr. Davis appeared for the defendant, and Mr. Wilson, Assistant Crown Solicitor, for the prosecution.

Mr. W. C. Robertson, of the Department of Agriculture, stated that samples of Victor Plant Food and Victor Plant Food No. 2, taken at the works of the company on 11th April, were below the guaranteed composition as regards nitrogen, the percentage deficiency being approximately 9 per cent.

It was further stated in evidence that whereas the registered retail price of Victor Plant Food was £25 per ton, its value, as determined from the guaranteed analysis and unit values for 1927, was only about £7 2s. a ton. The actual value on the analysis of the sample taken was only £6 11s. 8d. a ton.

In the case of Victor Plant Food No. 2 the registered retail price was £15 per ton, and the value on the guaranteed analysis approximately £7, while the actual value of the sample analysed was £6 10s. per ton.

BACK-YARD POULTRY KEEPING.

W. C. Rugg, Chief Poultry Expert.

There are few articles of food more necessary in a household than the new-laid egg. Without eggs, the modern housewife can no more provide tasty meals than the motorist can run his car without oil. Yet the number of householders who are utterly ignorant of how easy it is to keep a house supplied with eggs is amazing.

Most city men look upon the hen as a mischievous pest, ever ready to fly into the garden and scratch up the garden seeds and all the choicest seedlings. This probably is what she will do if she gets a chance, for she knows she has a reputation to keep up as an egg producer, and if she be not given the right materials to enable her to do the job, she will take the first opportunity of helping herself out of her owner's or, maybe, a neighbouring garden. For it is the very things that are to be found in the garden in the shape of grubs, insects, and green shoots that the suburban poultry-keeper so often neglects to supply.

Poultry Keeping in a Small Yard.

Various societies in Melbourne interest themselves in the prevention of cruelty to horses, dogs, &c., and I sometimes think there is room for still another—a society for the prevention of cruelty to the hen. In most cases this cruelty is due to ignorance, or perhaps a want of thought. At many suburban homes fowls are kept ostensibly to supply eggs for the house, but the conditions under which they are compelled to exist make it impossible for them to lay a profitable number of eggs. It is not strange, therefore, that one so often hears the remark "It's cheaper to buy eggs than keep fowls." Many people suppose that any damp, dark corner of a yard is good enough for fowls to live in for every day of the year, and think that, irrespective of age or quality, they should lay large numbers of eggs. It is only the healthy, active, and contented hen that will lay a large number of eggs, and for her to be healthy and active she must have bright, sanitary quarters, plenty of clean straw or litter to scratch in, and be supplied with a variety of good wholesome food.

A small number of fowls should be kept by families in the suburbs of all large cities. The eggs from small flocks may be produced at relatively small cost, because of the possibility of utilizing table scraps and kitchen waste which otherwise would be thrown away. A small lot of hens, even as few as six or eight, should produce sufficient eggs for a family of four or five throughout the year, except during the moulting period, which occurs in late autumn and early winter, and by the preservation of surplus eggs laid in the spring and early summer, this period of scarcity can be provided for. Not only will the eggs from the home flock materially reduce the cost of living, but the superior freshness and quality of the eggs are in themselves well worth the effort expended.

Objection is sometimes raised to the keeping of fowls in towns because of the odour which may result, and also because of the noise made by the roosters crowing. Where there are city regulations prohibiting or controlling poultry keeping, it is necessary to find out what the provisions are and to conform to them.

If droppings' boards are used under the perches, and they are cleaned daily, or if the floors of the houses be covered with litter, say, 5 or 6 inches of straw (and the litter be changed every ten or twelve weeks), provided the floor is perfectly dry, there will be no annoying odours.

The Keeping of a Male Bird Unnecessary.

Male birds need not be kept, unless the breeding of chickens is desired. The fact that there is no male in the pen will have absolutely no effect on the number of eggs laid by the hens. A pen of six Black Orpington pullets at the Burnley Egg-laying Competition have just made an official record for winter egg production by laying 643 eggs in 122 days, ending 31st July, and no male birds are allowed with the pullets at the competition.

If it is desired to rear chickens, it is necessary to keep the male bird with them for a few weeks, as it is unwise to hatch chickens intended for egg production, except in the months of July, August, and September; and the male bird should be disposed of just as soon as sufficient eggs have been procured for the hatching of the required number of chickens. This is desirable, not only to prevent the chance of his annoying residents by crowing, but also to save the expense of feeding him. Another reason is that infertile eggs keep better than fertile eggs, and, consequently, are superior for preserving and for market.

The Best Breed.

The kind of fowl to keep must be left to the householder. My advice always is to select the breed for which one has a preference, because one is more likely to give that breed better attention than a breed that does not appeal to him.

Egg production is a matter of strain more than breed, and good egg producers are to be found in many breeds, but certain of them are superior for table purposes. For egg production only, White Leghorns have proved their worth in almost every country in the world, and they will probably thrive better under intensive conditions than do most other breeds. The Black Orpington has the recommendation of being both a good layer and a fair table bird, but is not likely to give as good results under the intensive conditions as White Leghorns. The birds in greatest demand in England as table birds are the white-legged breeds, with a white skin and white fat; some of these breeds have been greatly improved as egg producers, and are fast coming into favour in Victoria. Of them, Light Sussex and Buff Orpingtons are fair layers and beautiful table birds. They are docile, easy to handle, and can be confined with very low fences. I find 4 feet of wire netting sufficient to keep Light Sussex out of my garden. Any of the Wyandotte varieties are ornamental, make nice table birds, and lay a fair number of eggs.

Whatever breed the householder decides to keep, he should procure his stock from a reliable poultry-breeder, remembering that a good article cannot be bought at a cheap price. If it is decided to purchase a setting of eggs and hatch them, it is better to pay 10s., or even 20s., for a setting of thirteen to fifteen eggs from good stock rather than to buy eggs at a low price, and go to all the trouble and expense of rearing chickens only to find the pullets unprofitable.

Day-old chicks from good stock can be bought at from 10s. to 15s. a dozen, but it should be remembered that over a season the percentage of cockerels to pullets is usually about the same. Pullets just on the point of laying are worth anything from 10s. to 20s. each, but some breeders will sell young pullets ten to twelve weeks old at 8s. to 12s. a pair.

Whatever is decided on, it is wise to make full inquiries as to the quality of the stock to be purchased, and, where possible, visit the breeders' yards. Most of them are only too pleased to show visitors over their pens, and give what information they can. The number of birds that can be most efficiently kept depends, firstly, on the space available, and secondly, on the amount of table scraps available for feed. It is a mistake to overstock; better results are obtained from a few hens in a small yard than from keeping a larger number there.

Housing.

In housing a large number, it is usual to allow 4 square feet to each bird; but for small lots, more space per bird is required. A small shed, 10 feet deep and 8 feet wide, will make comfortable quarters for ten or twelve hens; a smaller house, of course, would suffice, but if given the extra space they will certainly thrive better. This shed should face the east, and be so situated that the early morning sun shines right into it, purifying the air, and keeping the litter dry. If the shed is 6 feet high in front and 5 feet at the back, there will be sufficient head room for the attendant when cleaning out or looking after other duties. For larger flocks sheds should be both deeper and higher. The perches should be about 2 feet from the ground, and about 8 inches perch room per bird should be allowed. If more than one perch is required, they should be all on one level and 15 inches apart. The perches should be at least 2 inches wide—2-in. x 1-in. battens will do if the perches are short, but in longer houses 2-in. x 3-in. timber on edge will be more satisfactory.

Housing need not be expensive, but a dry floor is essential; one of concrete or brick is to be preferred; good ventilation is necessary but there must be no draughts. What is known as the open-fronted type of house is quite satisfactory, if boarded up 18 inches from the ground, and the rest of the walls wire-netted. The boarding will keep the litter from being scratched out, and so making the paths untidy.

Guarding Against Vermin.

Perches, nest-boxes, and inside fittings should be up off the floor, and be so constructed that they can be easily removed for examination for vermin. All timber used inside, including perches, should be given a coating of hot tar; this fills up any crack or gum veins, and there will be

less harbour for red mites to breed in. These insects are really the greatest pest the poultryman has to contend with, and they are probably the cause of more loss in egg production than any other kind of vermin, for all the other kinds can be easily kept down by regular attention.

It is only necessary to paint the perches and joints of the timber with tar oil, crude phenyle, or sheep dip about every three months; but two applications should then be given, the second following ten days after the first. The reason for giving a second application is that red mites lay their eggs in cracks and crevices, and these eggs hatch in eight to nine days. Great care should be taken when applying the oil, or whatever mixture is used, for it is very easy to miss some of the mites; if so, they will hatch out, and the whole place be re-infested in a few days. By giving a second painting after an interval of ten days, one is likely to kill them all, and the house will be free of mites for some time. Red mites live in the cracks and crevices of the houses and perches, and visit the birds only at night, engorge themselves with blood, and retire to their hiding places till the next night.

Hens will rid themselves of other vermin if given access to a good dust bath, which can be supplied in a box 2 feet or 2 ft. 6 in. square, 9 inches deep, filled to the depth of 6 or 7 inches with road dust, ashes, and two or three handfuls of sulphur. If this dust is sprinkled with water in the hot weather, birds will enjoy scuffling in it, and on the very hot days it will help a great deal towards lowering the temperature of their bodies, and so ward off attacks of heat prostration. Mortality from this cause is very high on some farms; several poultrymen lost 20 to 80 birds during one hot spell last summer. Birds liable to be affected by the heat are usually those in full lay, because the best layers are heavy feeders, and they feel the heat most. If dust baths are kept damp, and the houses and litter sprayed with water during the hottest part of the day, usually from 2 p.m. to 4 p.m., much of the trouble can be avoided.

A good dust bath does a great deal to prevent another parasite from attacking the birds' legs. This is known as scaly leg mite, which is a minute insect that breeds under the scales of the birds' legs, causing irritation, and making them unsightly. Further, it is possible that these insects are carriers of disease. Scaly leg mite can be easily cured if taken in hand in the early stages. As soon as the scales show white under the edges, the bird's legs should be washed with soap and water; soapsuds after washing day are very good for the purpose; after a thorough washing and scrubbing with a soft brush, a little vaseline and sulphur or lard and sulphur, well rubbed in, will quickly effect a cure.

Feeding.

A small number of fowls can be very economically fed, if all kitchen waste and table scraps are saved. Potato skins, banana and passion fruit skins, &c., should be either put through a mincer, or else cut up and boiled with bones and meat scraps, and mixed with bran and pollard, but care should be taken that the mixture is not sloppy, sodden, or too dry; a nice crumbly condition is what should be aimed at. I find the most satisfactory way to mix the mash is to place the bran in a mixing bowl, pour the boiled scraps on to it, then mix thoroughly and dry

off with pollard to a crumbly condition. Then any green stuff, cabbage, lettuce, or silver beet may be added; these green stuffs should never be boiled.

Rhubarb leaves should not be used for poultry; they contain oxalic acid which is injurious. Salt meat should not be given at any time. I do not think salt is necessary at all; but some poultrymen use small quantities (about 1 lb. in every 100 lb. of feed).

Fowls should be given as much food as they will clean up in about twenty minutes; any that is left should be removed. If mash is fed at 7 or 8 o'clock in the morning, a little mash or grain (say half an ounce of grain per bird) can be given at mid-day with a small quantity of green stuff. The evening meal should be a full feed of whole grains —a mixture of wheat, maize, and oats. Barley also is a good poultry food. Excellent results have been obtained when feeding Algerian oats and barley only, but fowls prefer wheat to any grain.

In all the free choice feeding experiments carried out by me at the Research Farm, when birds have had equal access to the four grains mentioned, they have in some months eaten more of one grain than another, but at the end of the year, when the total consumption was made up, the order of preference has always been wheat first, Algerian oats second, maize third, and barley fourth.

It is advisable to feed mixed grain, but it is also well for the poultryman to buy the varieties separately and mix them himself; he can then better determine the value of the mixture. In many samples of mixed grain offered for sale, the mixing has been done in such a way as to conceal some inferior grain that could not be sold by itself.

Fowls should have some succulent green stuff every day, and a little given after the grain feed at night will be of great benefit. Clippings from English lawn grass are very good, but milk thistles, barley grass, vegetable leaves can all be used.

Vegetable leaves and stumps should never be thrown on the ground in the poultry run; some of them may be left to decay, and possibly be the cause of ptomaine poisoning, or of an outbreak of infectious disease. Green stuff, if not chaffed, can be placed in wire-netting baskets and hung up in the pen, and the birds will pull it through the mesh.

Charcoal and shell grit or coarse gravel should always be available, and a constant supply of clean cool water is a necessity. Minced raw onions at the rate of three-quarters of an ounce per bird, once a week, is a splendid tonic. Spices and condiments are unnecessary, and some are injurious.

In conclusion let me say that if good stock, and good stock only, be kept in clean, sanitary houses, and given wholesome clean food, the owner will be surprised at the number and quality of the eggs produced.

THE REARING OF FOALS AND CALVES.

By R. J. de C. Talbot, B.V.Sc.

The mortality among calves and foals on some farms is very much higher than it should be. In a great many cases this is due to ignorance and lack of appreciation of what the young animals require.

To be a successful farmer, a man must be a competent breeder; in other words, he must have the ability to rear successfully the young animals born on the farm. In this article it is proposed to give a few hints which will be of some assistance in the rearing of foals and calves.

First we must recognize that, quite apart from the pleasure which should attend the rearing of one's own stock, there is the commercial aspect to be considered. Undoubtedly, it is cheaper to rear good foals and calves than to buy them.

Then, again, when a farmer rears his own stock he knows more about them, and what to expect from them. Another important point in this connexion, and especially in regard to calves, is that, by breeding one's own stock, one is limiting the possibility of the introduction of some contagious disease into the herd. By this I mean that if a farmer be able to keep his herd up to the full strength by breeding his own heifers, instead of having to purchase them in the open market, then he is lessening the risk of introducing such diseases as pleuro-pneumonia, nastitis, &c. With foals, if these are bred from sound stock the owner can be reasonably certain that they will not be so likely to contract such hereditary diseases as ringbone, sidebone, spavin, &c.

The Care of Breeding Animals.

Before dealing with the foal and the calf, it may be as well to mention something regarding the care of the mare or cow just prior to the birth of the young animals. This must be directed along common-sense lines, and it is difficult to lay down any set of hard and fast rules. A draught mare may be given steady work up to a few days prior to foaling; in fact, she is usually all the better for such treatment but walking pace should not be exceeded, and any strain or strenuous work should be avoided. Shaft work is generally associated with the possibility of accident or over exertion, and should be avoided. A liberal supply of sweet food of good quality is needed, and good chaff and grain and other foods rich in those elements which form flesh and bone may be required to supplement grazing.

In regard to the cow it is, of course, essential that she be dried off some time prior to the birth of the calf. When dry, she should not be turned out into some back paddock, where nothing better than native grasses are available. This, if not actually cruel, is certainly not fair to the cow, and she and the calf with her must suffer in consequence. She should be put in a good grass paddock, so that she may be in such condition as to be able to supply the young animal with all it requires. It is indeed poor policy to have dry cows in poor condition, since this condition will be reflected in the calf when it is born.

Care of Foals and Calves.

In the majority of cases on farms, little or no attention is entailed by the arrival of a strong and lusty foal or calf; in fact, animals do better when left to themselves, providing all is going well.

The first natural flow of milk, which is termed colostrum or beestings, varies very much in composition from normal milk. This milk is essential to the well-being of the young animal. The flow of this colostrum lasts for from fifteen to twenty-four hours. It contains an active principle which has a specific cleansing effect on the mucous surface of the alimentary tract of the young animal and, being laxative in its action in much the same way as is castor oil, it frees the tract from all prenatal accumulations. It is rich in growth-producing ingredients and has the effect of stimulating and bringing into activity the fermentative and digestive functions which are essential to growth.

As there are certain fundamental differences in the rearing of calves and foals, these will now be dealt with separately.

The Foal.

In regard to foals, it must be realized that the best natural aids for development constitute the bedrock of successful rearing, so that breeders should observe carefully the maternal instinct of the mother and the condition of the foal. The diet of the mare should be carefully watched, because injudicious feeding of the dam will be reflected in the foal. For instance, scouring by the foal is often due to the mare receiving damaged or musty food or foul water.

Constant attention is necessary to ensure full, vigorous growth of the foal and robust health in the mare. In a clean, grassy paddock the flow of milk will be well maintained, but should there be any tendency for either the mare or foal to fall off in condition, the grazing must be supplemented by good and stimulating food. Sometimes it is necessary to administer a laxative to the foal. For this purpose a table-spoonful of glycerine may be given. If this fails to achieve the desired result, then a dose of a table-spoonful of castor oil should be given, care being taken that only the purest oil is used.

In cases where the mare is required for farm purposes a month's rest is usually sufficient before she is put into work again, the foal, of course, being allowed to remain handy so that it can receive a drink at convenient periods.

The usual time of weaning is about five to six months after birth, but before this time the foal will have already begun to graze. This grazing should be supplemented by crushed oats—an excellent food for building up the young animals. After weaning, the youngsters should be put in a well-grassed paddock which is sheltered from the weather, and, in addition to grazing, they should receive good wholesome chaff to which crushed oats has been added.

When, as sometimes occurs, owing to some accident to the dam, foals have to be hand fed with cow's milk, or "poddied" as it is usually termed, it is important that the difference between cow's and mare's milk be understood. Cow's milk requires to be modified

very much before it is fit to be used as a substitute for mare's milk. The proportions of fat, acid, and curd in cow's milk are largely in excess of those in mare's milk, while the proportion of sugar is lower; therefore, more water and sugar have to be added to it to make it suitable for the foal. The mixture should be 4½ pints of cow's milk, half a pint of water, and three-quarters of an ounce of sugar. If possible, sugar of milk should be used—not ordinary sugar.

In hand feeding, the foal should not receive more than one pint at a time, but it should have that amount very often, and the milk should always be given at blood heat. The foal will soon learn to drink out of a bucket, although at the beginning a feeding bottle may be necessary. Week by week the milk diet can be strengthened by lessening the quantity of added water, and in three or four weeks whole cow's milk can be given, the additions of sugar of milk, however, being continued.

Before being turned out after weaning, the foal should be handled to quieten him. Patient and intelligent coaxing, with judicious periods of waiting are necessary to inspire confidence. Patience, gentleness, and sympathy must predominate at this time. When the foal has been disciplined he may then be turned out.

The Calf.

The newly-born calf should be removed from the mother before it has had time to suck. If this is done then, the mother will fret less, and the calf will learn to drink very much more quickly. As with the foal, the first milk, or colostrum, should always be given to the calf because of its medicinal properties. Calves should be taught to drink without the fingers. Rubber teats are unnecessary and, as they are usually not kept sterilized, they may cause serious gastric trouble.

Calves should never be allowed to over-drink. If the quantities can be measured, or weighed out, so much the better. Two quarts of milk is quite enough for a single meal, but where numerous calves have to be fed, a practical way of ascertaining when a calf has drunk sufficient is to watch the left hollow of the hip swelling until the skin becomes almost level. This indicates that the calf has had enough, and it should not be allowed to drink further.

Small bails are sometimes provided in which each calf is taught to bail up when feeding. These are very useful in ensuring that every animal gets its proper share and, further, the early training in bailing-up is desirable.

Three small feeds a day are probably best for the youngest calves, but twice a day feeding is usual, and providing the animals are not allowed to over-gorge it is quite satisfactory.

Over-distension of the stomach due to too much milk is, next to dirty feeding vessels, the commonest cause of "scours" in calves. All utensils used for feeding or storing milk should be kept perfectly clean and be well scrubbed out after each using.

Wherever possible, calves should be raised in the open. In this climate enclosed sheds may be dispensed with, and if sheds are used

at all they should be fairly lofty, and open at one side. Well-fed calves at liberty to exercise will suffer no harm from ordinary weather conditions provided that shelter from wind is provided for them.

Whole milk is necessary for the first three weeks. At three weeks a small quantity of separated milk, fresh and free from froth, should be blended with the whole milk to make up the quantity. The quantity of skim should be gradually increased, but not the total drink, until at five weeks no whole milk need be added. Never give excess, and never feed frothy or cold milk.

A few days before the liquid diet is reduced to skim milk completely, start to add one teaspoonful of boiled linseed cake meal. Gradually increase this amount, until within a few days a tablespoonful is being added. This will increase the feeding properties of the skim milk, and the quantities of two quarts of skim milk and one tablespoonful of boiled linseed meal twice a day need not be increased during the whole course of feeding, provided the calf has access to water and green picking and is given access to crushed oats in a trough, to be eaten at leisure. Oaten or lucerne hay is good for calves, but chaff is not quite suitable.

Good green feed clean and fresh has special virtues for either old or young calves, and every endeavour should be made to have it available for them. There is nothing better than good pasture. This and a clean water supply, especially in summer, are two accessories which, next to a supply of skim milk, constitute the greatest boon to the calf-rearer. Closely grazed pastures are dangerous to calves, particularly during wet seasons, as they are liable to pick up the eggs of parasitic worms which may be the cause of heavy mortality in young cattle.

Ailments in calves are most commonly due to digestive derangement, and it is should not be forgotten that too violent a change of diet is liable to upset a young animal's digestion. If the diet has to be changed it should always be done gradually, so that the animal may become accustomed to the new food. If this is borne in mind and all feeding utensils be kept scrupulously clean, and the animal be given a plentiful supply of green feed, calf-rearing should present no difficulties.

BOTTLING AND PRESERVING OF FRUIT BULLETIN.

A new and enlarged edition of Bulletin No. 43 on the Bottling and Drying of Fruit and the Making of Jams, Jellies, Pickles and Sauces, by Miss Knight, Fruit Preserving Expert, has just been published. Copies can be had free of charge from the Department of Agriculture.

PREPARATIONS FOR THE MAIZE CROP.

By P. Ryan, B.Ag. Sc., Inspector of Agriculture.

Preparation for the maize crop may be considered under the three headings of the maintenance of soil fertility, cultural operations, and the selection of seed.

Up to the present the maintenance of the fertility of the maize lands of Victoria has not received much attention. But this is a problem that is becoming more serious each year, and one that must receive serious consideration if the maize yields of the State are to be maintained at the present high level.

For its best development the maize plant requires a soil well supplied with organic matter. It is a gross feeder, and will thrive on land in such high condition as would cause other cereals to lodge. Indeed, it is impossible to have a soil too rich for maize.

Analyses show that the crop removes from the soil larger amounts of the important constituents of plant food—nitrogen, phosphoric acid, and potash than does almost any other farm crop. For example, a 50-bushel crop of maize takes from the soil 45 lb. of phosphoric acid, 50 lb. of potash, and 75 lb. of nitrogen.

More important still is the fact that the maize crop, because of the large bulk of material produced, and also on account of the fact that it is cultivated between the rows, makes heavy demands upon the humus or decayed organic matter of the soil. Intertillage stimulates the activities of the nitrifying bacteria which break down the organic matter into nitrates.

The bulk of the Victorian maize is grown on the very fertile flats on the Snowy, Tambo, and Mitchell rivers in the vicinity of Orbost, Bruthen, and Lindenow. The wonderful fertility of these flats is demonstrated by the fact that maize has been grown continuously on them for upwards of 30 years—in many cases without the application of any manure—and the yields are still amongst the highest in the world. On soils of lesser natural fertility such a practice would have had to be abandoned long since, owing to the diminution in yields. Indeed, evidence is not wanting that on such of these soils as have not had their fertility renewed by flooding in recent years, the practice of continuous maize-growing will have to be abandoned in favour of a well-planned system of rotation cropping and the keeping of live stock, so as to provide for the restoration to the soil of the humus which has been removed by the maize crops.

The soils in question are showing definite signs of humus exhaustion. The once friable lands of mellow tilth and high moisture-retaining capacity have become difficult to work, they dry out readily, and set and crack easily, and in general are now difficult to keep in good tilth.

The question of what rotation should be adopted will depend largely on individual circumstances. Lucerne and red clover are worthy of consideration as rotation crops. Both do well on these flats, and individual farmers who have grown them have been surprised at the invigorating effect on the succeeding maize crop. Both crops are legumes, and, therefore, are able to use the nitrogen of the air and store in in the soil in the form of nitrates. Lucerne, of course, will occupy the ground for several years, but cow grass is suitable for a shorter rotation.

Another practice that should be worthy of consideration is the sowing down of a mixed pasture of grasses and clovers either for dairying or for the topping off of sheep and lambs.

Some farmers, realizing that humus exhaustion has reached a serious stage, plough in their maize stalks instead of burning them. This is a step in the right direction, but it is doubtful if it will prove an effective remedy. Moreover, the practice is open to two objections as follow:—

(1) The danger of providing a heavy carry-over of any fungus diseases or insect pests that may be present in the crop. A good stubble burn is one of the best means of keeping these diseases and pests in check; while ploughing in the stalks, by providing a continuity of host plants, tends to favour their spread.

(2) When the ploughing-in is done only a short time before the succeeding crop is sown (and this is what frequently happens) the stalks have not time to become thoroughly decayed and incorporated into the soil. The result is that the ground is left open with large air spaces in it, and the capillary rise of moisture from the subsoil is interfered with.

While rotation cropping in association with live stock farming will help to prevent the depletion of the humus of the soil, it does not return any of the mineral plant food which is removed by the maize crop; hence the necessity for the application of artificial manures.

For the past few years the Department of Agriculture has been conducting maize manurial tests at Lindenow. While the results of these tests are not yet definite, they indicate that the application of 1 cwt. of superphosphate and ½ cwt. of sulphate of ammonia per acre will produce a profitable increase in yield.

Cultural Operations.

Land on which maize is to be sown should be ploughed deeply in the autumn or early winter. The advantage of autumn ploughing over spring ploughing has been proved by the results of experiments conducted over a period of five years at the Grafton Experimental Farm.

The yield from the plots ploughed in the winter was 53 bushels, and from those ploughed in the spring 41 bushels, showing an advantage of 12 bushels per acre in favour of winter ploughing.

Early ploughing allows the winter rains to be trapped and stored in the soil for use by the maize plant at the critical stage in its growth. In addition, the mellowing and aeration of the land promotes the activity of the nitrifying bacteria which work on the organic matter of the soil and produce nitrates for the use of the crop.

On many maize farms there is a tendency to delay the ploughing in order to utilize to the full extent the fodder value of the stalks. In a season such as the present, when grass has been scanty, one can understand farmers desiring to get as much grazing as possible from their maize stalks. But it is doubtful if the value of the feed obtained is sufficient to compensate for the lowering of the maize yield due to the delay in ploughing and the damage to the tilth of the soil caused by cattle tramping it in wet weather. The effect on the tilth is most serious

on heavy soils, causing them to turn up in large clods, which are difficult to break down. A marked instance came under my notice on a recent visit to Lindenow. I was walking over maize land which had received its initial preparation, and was struck by the remarkable difference in the tilth of two adjoining pieces of similar land, both of which had been under maize the previous year. In response to my question, the owner explained that the difference was due to the fact that, on one piece, cattle had been allowed to graze during the winter, while they had been kept off the other altogether. He further added that the cost of the cultural operations on the land which had been grazed was 30 per cent. higher than that on the land from which cattle had been excluded.

The cultivation operations subsequent to ploughing should aim at producing a fine, firm, well-consolidated seed-bed. On friable soils the use of the harrows and cultivators will bring about the desired result. The first working should be deep, and later workings shallow. On stiff soils a second cross ploughing in the early spring may be advisable; this should be shallow, and the land then worked down to a fine tilth. A thorough preparation of the soil is essential for satisfactory yields, as no amount of cultivation after the crop is sown can make up for a badly prepared seed-bed.

Selection of Seed.

Considering the importance of proper seed selection in maintaining the yield of any variety of maize, it is surprising to find how little attention is paid to that operation on many farms. It is a popular misconception that it is beneficial to obtain seed from another district. On the contrary, the effect of acclimatization is so marked that a grower should always use his own seed or seed raised in his own district by a reputable farmer.

There is no doubt that the maize yield of Victoria would be very appreciably increased if growers could be prevailed upon to select their seed from the growing crop in the field. Under the present general practice of selecting cobs from the crib at threshing time, only the size and shape of the ears can be considered, and there is no means of telling whether the bent-looking ears have come from prolific plants, or, in other words, whether they owe their superiority to hereditary characters or to better conditions of soil and moisture.

The kind of plant from which seed should be taken is one which has desirable field characters, and which, without having any advantage in environmental conditions, is a more prolific yielder than the plants surrounding it.

There is no doubt that the practice of selecting seed from the crib has been responsible for the maize in East Gippsland becoming later in maturity. The biggest ears are sought without any regard being paid to the fact that they have probably taken longer to develop. By judicious selection in the field this tendency can be checked and uniformity of ripening secured.

It will be found advisable to make a further examination in the barn of the ears selected in the field, and to retain only those showing the following characteristics:—Freedom from disease; good size and weight; high percentage of grain to core; trueness to type; and a full supply of sound, heavy, plump grain. Other desirable characters of less

importance are cylindrical shape, straight, regular rows, well covered butts and tips.

In view of the apparent spread of a fungus disease (*Fusarium*), which causes rotting of the roots, stalks, cob, or grain, emphasis may be laid on the necessity for selecting seed from plants and cobs showing absolute freedom from disease. The disease in question is carried over inside the grain, so that no seed treatment is of any avail. It has been found that a soft-grained, rough-dented type of maize has a greater tendency to carry over the disease than a smooth-dented, harder type of grain. This is a point worthy of consideration by those farmers who have made almost a fetish of selecting rough-dented seed in order to get depth of grain.

LUCERNE TOP-DRESSING TESTS.

By L. C. Bartels, B.Ag.Sc., Senior Irrigation Officer, and E. T. Beruldsen, B.Sc.

The experiments in Lucerne Top-dressing instituted in several districts by the Irrigation Investigations Committee in extension of the work at Werribee Research Farm have been continued throughout the season. The plots include those at Swan Hill—laid down in 1924 on the farm of S. Masters; at Tongala, 1925 (Mr. J. Bullingham); at Stanhope, 1925, (Mr. G. Fielding); and at Cohuna, 1926 (Mr. G. Major).

Positive results have been obtained at all places. A lively interest has been awakened and there is a marked increase in the amount of manure now applied.

The main feature of the tests is the remarkable response to manuring on the Swan Hill flats. This has been reported on previously. The benefits have been very well sustained and the results for the three years are consistent. The heavily manured plots seem to improve each year and the unmanured plots are declining. The results from the series of plots are set out in the following tables.

More hay was obtained last season from the second cutting of the plot receiving 6 cwt. of super. per acre than from five cuts of the unmanured plots alongside. The second cut of the 6 cwt. super. plot yielded the equivalent of 52.7 cwt. of hay (15 per cent. moisture) per acre, and the aggregate return from five cuts was over 9 tons per acre. (A neighbouring settler, Mr. R. Spence, who manured liberally, was able last year to emulate these results; he obtained six cuttings. Most of the hay was sold by weight at the high prices ruling.)

The water insoluble phosphatic manures, bone fertilizer and rock phosphate showed a slightly increased effect last season, but the yields fall so far behind those produced by superphosphate that there is no encouragement to use them. From the results obtained it is evident that the liberal use of superphosphate by settlers on the Swan Hill flats will bring an assured return.

It is noted that there has been a marked increase in the use of gypsum which is available from a deposit adjoining the flats. This is to

be commended although it must be borne in mind that gypsum is not a substitute for super. It will make the soil on the flats more tractable under cultivation and it will reduce cracks in the soil.

In a lesser degree the results at Tongala and Stanhope were the same as at Swan Hill. The Cohuna results were not so decisive, but all demonstrate the value of superphosphate in quantities up to 4 cwt. per acre.

Lucerne Top-dressing Tests.

SWAN HILL.

SUMMARY OF RESULTS FOR THREE SEASONS.

Plot.	1924–25.	1925–26.	1926–27.	Average.
	cwt.	cwt.	cwt.	cwt.
1. No manure	58·5	61·1	47·8	55·8
2. Super., 6 cwt. per acre	141·9	176·3	183·0	167·1
3. Super., 3 cwt. per acre	106·7	146·1	152·6	135·1
4. No manure	67·8	72·7	57·1	65·9
5. Super., 2 cwt.	101·2	123·4	120·2	114·9
6. Super., 4 cwt. (in two applications)	122·9	159·1	161·4	147·8
7. No manure	77·5	83·3	73·3	78·0
8. Super., 2 cwt.; lime, 1 ton in 1924	112·5	138·35	135·8	128·9
9. Super., 2 cwt.; gypsum, 1½ tons in 1924	118·5	148·65	139·15	135·4
10. No manure	74·7	78·25	64·5	72·5
11. Ground rock phosphate, 2 cwt. per acre	79·1	83·9	84·1	82·4
12. Bone fertilizer, 2 cwt. per acre ..	87·4	91·1	82·35	86·95
13. No manure	79·8	71·3	51·25	67·45

TABLE SHOWING INCREASED RETURN FROM TOP-DRESSING.

Plot.	Average Yields Three Seasons.	Check Yields.	Increase due to Manure.	Value of Increase at £2 10s. per ton.	Cost of Manure.	Profit.
	cwt.	cwt.	cwt.	£ s. d.	£ s. d.	£ s. d.
1. No manure ..	55·8	55·8	..	..	..	..
2. Super., 6 cwt. ..	167·1	(59·2)	107·9	13 9 9	1 14 6	11 15 3
3. Super., 3 cwt. ..	135·1	(62·5)	72·6	9 1 6	0 17 3	8 4 3
4. No manure ..	65·9	65·9	..	..	..	..
5. Super., 2 cwt. ..	114·9	(69·9)	45·0	5 12 6	0 11 6	5 1 0
6. Super., 4 cwt. (in two applications) ..	147·8	(74·4)	73·4	9 3 6	1 3 0	8 0 6
7. No manure ..	78·0	78·0	..	..	..	..
8. Super., 2 cwt.; lime, 1 ton, 1924 ..	128·9	(76·2)	52·7	6 11 9	1 8 3	5 3 6
9. Super., 2 cwt.; gypsum, 1½ tons, 1924	135·4	(74·3)	61·1	7 12 9	0 16 6	6 16 3
10. No manure ..	72·5	72·5	..	..	..	..
11. Ground rock phosphate, 2 cwt. ..	82·4	(70·8)	11·6	1 9 0	0 11 0	0 18 0
12. Bone fertilizer, 2 cwt.	86·95	(69·1)	17·85	2 4 6	0 18 0	1 6 6
13. No manure ..	67·45	67·45	..	..	..	..

TONGALA.

TABLE SHOWING INCREASED RETURNS DUE TO TOP-DRESSING LUCERNE—AVERAGE TWO SEASONS.

Plot.	Average Yields per Annum, Two Seasons.	Check Yields.	Increase due to Manure.	Value of Increase at £2 10s. per ton.	Cost of Manure.	Profit.
	cwt.	cwt.	cwt.	£ s. d.	£ s. d.	£ s. d.
1. No manure ..	87·9	87·9	..	..	..	..
2. Super., 1 cwt. ..	91·7	(82·6)	9·1	1 2 9	0 5 9	0 17 6
3. Super., 2 cwt. ..	92·9	(77·2)	15·7	1 19 3	0 11 6	1 7 9
4. No manure ..	71·9	71·9	..	..	..	..
5. Super., 4 cwt. ..	102·8	(68·1)	34·7	4 6 9	1 3 0	3 3 9
6. Super., 4 cwt. (in two applications) ..	99·9	(64·4)	35·5	4 8 9	1 3 0	3 5 9
7. No manure ..	60·6	60·6	..	..	..	..
8. Super., 2 cwt.; lime, 1 ton in 1925 ..	88·4	(59·85)	28·55	3 11 6	1 11 6	2 0 0
9. Super., 2 cwt.; gypsum, 1 ton in 1925	85·1	(59·1)	26·0	3 5 0	1 0 6	1 18 6
10. No manure ..	58·35	58·35	..	..	..	..
11. Super., 2 cwt.; sulphate of potash, 1 cwt.	83·4	(57·2)	26·2	3 5 6	1 6 6	1 19 0
12. Bone fertilizer, 2 cwt. per acre ..	66·5	(56·05)	10·45	1 6 3	0 18 0	0 8 3
13. No manure ..	54·9	54·9	..	..	..	..

STANHOPE TESTS.

AVERAGE, TWO SEASONS, 1925-6 AND 1926-7.

Plot.	Average Yields Two Seasons.	Check Yields.	Increase due to Manure.	Value of Increase at £2 10s. per ton.	Cost of Manure.	Profit.
	cwt.	cwt.	cwt.	£ s. d.	£ s. d.	£ s. d.
1. No manure ..	41·2	41·2	..	..	..	..
2. Super., 1 cwt. ..	52·4	(44·2)	82	1 0 6	0 5 9	0 14 9
3. Super., 2 cwt. ..	65·0	(47·1)	17·9	2 4 9	0 11 6	1 13 3
4. No manure ..	50·1	50·1	..	..	..	..
5. Super., 4 cwt. ..	65·5	(50·9)	14·6	1 16 6	1 3 0	0 13 6
6. Super., 4 cwt. (in two applications) ..	70·85	(51·7)	19·15	2 7 9	1 3 0	1 4 9
7. No manure ..	52·5	52·5	..	..	..	..
8. Super., 2 cwt.; lime, 1 ton in 1925 ..	71·95	(54·9)	17·05	2 2 6	1 11 6	0 11 0
9. Super., 2 cwt.; gypsum, 1 ton in 1925	75·6	(57·4)	18·2	2 5 6	1 6 6	0 19 0
10. No manure ..	59·8	59·8	..	..	..	..
11. Super., 2 cwt.; sulphate of potash, 1 cwt.	84·4	(58·0)	26·4	3 6 0	1 6 6	1 19 6
12. Bone fertilizer, 2 cwt. per acre.. ..	70·8	(56·2)	14·6	1 16 6	0 18 0	0 18 6
13. No manure ..	54·4	54·4	..	..	..	..

Not the least value of lucerne top-dressing is the fact that it extends the growing period of the crop. This was demonstrated in a most marked manner on the various plots last season. The super. top-dressed lucerne made earlier and more abundant spring growth than the unmanured lucerne, and at the end of the season there was relatively good growth on the manured plots, and very little on the untreated plots. In fact, there was a noticeable difference throughout the winter, but this winter growth is not recorded in the yields. The plots are grazed for three months—May, June, and July.

Autumn and Winter feed for stock is of the greatest value to dairymen, particularly in lean years like the present one, and it is safe to say that liberal manuring affords one means of augmenting the available grazing. The value of this winter feed alone will go far to recompense farmers for the outlay on top-dressing.

Top-dressing lucerne has been carried on at the Werribee Research Farm for years, and before the practice had extended comment was often made as to the splendid winter growth of the lucerne stands there as compared with those in other districts. This was recorded in the *Journal of Agriculture* for September, 1919. There is no doubt that this winter growth is the aftermath of the manuring.

A gathering of Tongala settlers on the farm of Mr. J. Bullingham in the autumn of this year were very much impressed with the difference in growth on the manured and unmanured plots.

Top-dressing will rejuvenate old stands. The lucerne in the plots at Swan Hill is now eight years old, and the vigor and density of growth on the heavily manured plots could not be exceeded in a stand two years old. Before manuring the lucerne appeared thin and weedy, as the unmanured plots are to-day, but the new vigor given to the lucerne has enabled it to smother the weeds to a large extent. Umbrella grass (*Chloris*) and couch (*Cynodon dactylon*) have been kept down in this way.

The enhanced feeding value of top-dressed lucerne is an important result proceeding from the use of super. It cannot be measured on the plots, but the experience of a Stanhope settler, Mr. E. Hadfield, who was encouraged to manure his lucerne, may be cited as an example. His cows were frequently ailing and he used several hundredweight of mineral licks every year in an endeavour to remedy the trouble, with only moderate success. Since he has top-dressed his lucerne and mixed pastures his cows neglect the licks and sickness in his herd has been almost eliminated.

One still meets farmers who profess to doubt the wisdom of top-dressing. Old prejudices die slowly and one has to counter the following objections:—

Sheep manure the land sufficiently.

Superphosphate is only a stimulant and a root tonic.

Bone fertilizer is superior because it builds up the soil.

Rock phosphate is cheaper and has nearly twice the phosphoric acid content.

One application of super. lasts for many years, and repeated applications are unnecessary.

Nitrogenous manures have been applied without result and lime and gypsum have been used without much increase in yield.

The sheep droppings have considerable fertilizing value, but the amount of phosphate entering into the composition of the carcasses of sheep is in the aggregate very great. This is derived from the soil through the pasture and represents a severe drain on the reserves of the soil. Except on the richest land, it must inevitably lead to a reduced carrying capacity.

Super. is not only a stimulant. It is a plant food which supplies phosphoric acid in a readily available form. It has been observed that one effect of its application is to improve the root development, but this is part of the general invigoration of plants resulting from its use.

Some contend that bone fertilizer is superior to superphosphate because it is an organic manure and its use represents a cycle in the circulation of phosphoric acid. Reference to the results above listed will show that it is not as effective as superphosphate. It is too slow acting. In fact, the origin of superphosphate resulted from an endeavour to make the phosphoric acid in bones more soluble and it was first made from bones. Moreover, the rock phosphate from which super. is made had an organic origin from the accumulated excreta and remains of sea birds, and of the fish on which they preyed. This formed guano, and in process of time the mineral matter in these was leached into the coral below.

Rock phospate is cheaper, but under the conditions at Swan Hill, where it was tried, it proved little better than no manure, although the application of 2 cwt. per acre was equivalent (in actual phosphate content) to more than 3 cwt. of super.

The disappointments in regard to certain manures arise from a wrong conception of the functions of particular manures. The use of expensive nitrogenous manures on lucerne is unnecessary. Lucerne gathers its nitrogen by the agency of the nitrifying organisms in the nodules on the roots.

Lime and gypsum both benefit lucerne when applied as supplements to superphosphate. Some farmers do not properly understand that they may not be used as substitutes for phosphoric manures. They contain no phosphoric acid and until the deficiency of that plant food is met, other fertilizing materials will be of little use. These two substances are soil amendments. The relative cheapness of gypsum at Swan Hill will encourage farmers to use it to make their soils more tractable, but it will be noticed in the record of results that extra superphosphate has a far greater potency in augmenting yields.

The value of a heavy dressing of super. may be evident for more than one year, but it must be borne in mind that heavy lucerne crops remove in one year six times as much phosphatic acid as a ten-bag wheat crop. To maintain yields repeated dressings are advisable.

There is a valid objection from those who affirm that in spite of liberal manuring they cannot secure the results claimed for it.

It is a fact that many of the lucerne stands have made only stunted growth, particularly during the last two or three seasons, but the cause underlying this is the high moisture requirements of the lucerne and the failure of the irrigation water to penetrate to the subsoil.

SEASONABLE HINTS ON FRUIT GROWING.

By J. M. Ward, Superintendent of Horticulture.

It is pleasing to be able to state that the present prospects for good crops of deciduous fruits are particularly bright, but one cannot forecast what may happen between now and the setting of the blossoms. The chief concern of the orchardist at this period is for his trees to set fruit, and, once having done this, he is hopeful that the fruit will remain fairly free from disease.

There are three things essential for a good setting of fruit—a plentiful supply of plant-food, good weather conditions during blossoming, and freedom from thrips. The first-named can be controlled by the orchardist; weather conditions are beyond control; and, unfortunately at the present juncture, one can almost say the same of thrips.

When the tree is blossoming, it is making a great demand upon plant-food, to enable the flowers to perform their proper function and set fruit. Should there be a lack of food, a light setting may result. This can be considerably obviated by applying a liberal dressing of fertilizer, such as potash, phosphoric acid, and nitrogen.

Potash should be given in the form of sulphate or muriate of potash at the rate of 1 cwt. to 1½ cwt. per acre, and should have been applied during July or August to enable the tree to make full use of this plant-food during the blossoming period, and thus assist in the setting of the fruit. Apple growers to give a dressing of potash for the coming season's crop. This should be applied not later than the end of September. Phosphoric acid can be applied in the form of superphosphate or bonedust at the rate of 6 to 8 cwt. per acre.

To apply nitrogen in a commercial form, such as nitrate of soda, sulphate of ammonia, or dried blood, is expensive in many ways; therefore nitrogen should be applied to the soil by the growing and ploughing under of green crops, particularly peas, beans, and vetches. Either of these, mixed with, say, barley or oats, will give volume for humus, as well as nitrogen. Growers should accept as a motto, "A green crop in my soil every year."

In past years growers in the Goulburn Valley have had heavy losses of pears, peaches, and apricots through the ravages of a fungus known as *Rhizopus nigricans*, but commonly called "Transit Rot." The effect of this disease is that the fruit rots in transit.

As practically all the Goulburn Valley growers are well acquainted with this disease, there is no occasion for me to supply details of it. There is one thing, however, that I want to stress, and that is, clean, and keep clean, all containers of fruit, also packing benches, and everything that fruit comes in contact with. I understand that at least one cannery in the Valley intends to establish a steam plant for the purpose of disinfecting all used cases that leave the cannery. Other canneries should follow this lead. But if it is to be effective, the growers must take a hand, and complete the job by sterilizing their picking bags, wagons, &c.

It is a simple matter to dip the picking bags or buckets into the copper of boiling water every washing day during the fruit season.

Packing benches, wagons, and the interior of packing sheds should be thoroughly sprayed with bluestone solution—2 lb. bluestone to 40 gallons of water. The fruit is rarely affected with transit rot before picking, and this parasitic fungus can easily be controlled by growers adopting hygienic methods. It will pay them to do so.

Brown Rot is another troublesome disease that Goulburn Valley and Doncaster growers have to contend with. This fungus is more or less disastrous once it makes its appearance in a stone fruit orchard during a humid season. All diseased fruit and wood should be carefully gathered and burnt—not buried. If allowed to remain in or on the ground beneath the tree, they become a breeding ground. Trees attacked by brown rot should receive a thorough spraying of lime-sulphur at 1-9 strength just before the buds burst. This should be followed with another application after the fruit sets, with the same mixture, at 1-30. Bordeaux mixture at 6-4-40 for the first spray may be used instead of lime-sulphur if the grower so desires.

Black-spot. Now, a word to the apple and pear growers, more particularly the apple people in the south. Owing to the short crop during the last season, the present indications point to a forthcoming heavy crop in all the States. Should this result, there will be keen competition, and those having the best fruit should receive the higher prices.

Having gone through a comparatively dry winter, the spring and early summer months may be rainy ones, in which case black-spot (*Venturia inequalis*) of the apple, and (*Venturia pirina*) of the pear will be prevalent, and many apples and pears will be of little commercial value. This should be guarded against by adopting control measures.

From experiments carried out at various times in Victoria during the past few years—more particularly in Gippsland—everything points to orchardists being able to control black-spot by thoroughly spraying the trees with lime-sulphur at a strength of 1 gallon of lime-sulphur to 15 gallons of water when from 70 to 80 per cent. of the blossoms are fully out, followed by a second application, at a strength of 1-30 just after the petals have fallen. Before growers in districts other than Gippsland use lime-sulphur, at the strength and periods mentioned, on the whole of the orchard, they are advised to first experiment on one tree, for burning may occur.

Experience in some parts of Victoria and Tasmania goes to show that excellent results are obtained by spraying with Bordeaux mixture at the 6-4-40 formula (6 lb. copper sulphate, 4 lb. fresh lime, 40 gallons of water), and applied at what is known as the "delayed dormant" period, i.e., just as the buds are bursting, followed with a further application, at 4-4-40 during the "pink" stage—after the buds have opened up, but just prior to the petals opening out. Both the above control mixtures are highly recommended.

The use of Bordeaux mixture after the fruit has set is not recommended. While it is effective in controlling black spot, the mixture causes a considerable amount of russeting, which to some extent lessens the market value of the fruit. Even when Bordeaux is used at the pink stage, a little russeting will occur. Spraying the apple tree for black-spot during the dormant season is practically waste of time and material, for the spores of the disease are not known to winter on the apple tree; therefore, applications at this period have very little effect

upon the disease. As the warmer weather approaches, the spores arise from the dead foliage and attack the fruit at the stem end of the blossom clusters; whereas the spores of the black-spot of the pear (*Venturia prinia*) are known to winter on the tree, and dormant spraying certainly is effective. At the same time, there is usually no necessity to apply a winter spray to pear trees to check the spot. If spraying is carried out as outlined, excellent results can be obtained.

Citrus Fruits.

Citrus growers should realize that with the approaching warmer weather the development of blue mould among the oranges and lemons will take place much more than is the case during the cold winter months. It should be borne in mind that the moulds do not affect the fruit unless the skin is injured in some mechanical way, such as dropping the fruit, marking it with the finger nails, roughly tipping it from the picking bag into the case, from the case to the grader, squeezing the fruit into place when packing, and the last two fruits that are packed are often injured by being pressed on to the edge of the top of the case. These little defects can easily be avoided. Thought, care, and the exercise of common sense are all that are required in the proper handling of citrus fruits to ensure the avoidance of blue mould, which is responsible for the loss of large quantities of oranges and lemons, particularly during spring and summer months.

SULPHURING DRIED FRUITS.

(*W. R. Jewell, M.Sc., B.Met., F.I.C., F.A.C.I., Agricultural Research Chemist.*)

2.—PEACHES AND PEARS.

Introduction.

The first article on this subject (Apricots, this *Journal*, August, 1927, Vol. XXV., Part 8, p. 457) stressed the necessity for ensuring that the sulphur dioxide content of dried fruit should not exceed 14 grains per lb. The principles of sulphuring and the factors influencing sulphur dioxide absorption were fully discussed.

As with apricots, sulphuring experiments with peaches (Elbertas) and pears (Bartletts) were conducted on a commercial scale, but owing to the adverse season the quantities of both peaches and pears were very small, and it was impossible to carry out exhaustive investigations. The results are, therefore, not complete, but it was imperative that the producer should have some guide as to sulphuring procedure during the coming season, even if a complete investigation were impossible. The experiments conducted were sufficient to indicate a safe and satisfactory sulphuring process for both fruits, and to show that peaches and pears do not absorb sulphur dioxide as readily as do apricots, and are not so easily over-sulphured.

The factors influencing sulphur dioxide absorption given in the previous article apply also to the fruit under discussion, and as detailed experiments were described with apricots, showing the extent to which the factors mentioned influenced absorption, it is unnecessary to repeat here similar results, varying only in degree, with peaches and pears. A summary of some of the experiments is given in the appendix.

Owing to the very small amount of fruit dried, most of the results are from sulphuring processes as normally carried out at various orchards in the Mildura district. It will be noted that, contrary to the results with apricots, in no case does the sulphur dioxide content exceed the prescribed limit, although it approaches it closely in one or two instances. The time that elapsed between sulphuring and analysis of samples was approximately the minimum time that could occur between sulphuring and export.

Conclusions.

As with apricots, it is impossible to lay down hard and fast rules for sulphuring peaches and pears owing to the disturbing influence of various factors, chief of which is, perhaps, the varied shape, size, and location of sulphur houses. The following recommendations regarding time of exposure and amount of sulphur may be taken as the maxima if excess sulphur dioxide is to be avoided. If a satisfactory product can be obtained with less sulphur and/or shorter exposures, so much the better. For more reasons than one it is obviously advantageous to reduce the sulphur and exposure to the minimum, consistent with a good-coloured product.

Peaches.

Peaches should be picked firmer than apricots, but should be uniformly ripe and slightly soft to the touch. Sulphuring is usually complete when the skins readily come away from the flesh. It was observed that sulphuring bleached, to a large extent, the redness frequently occurring in the flesh of Elberta peaches.

Type (A) Sulphur House (Airtight.)

Day sulphuring	...	7 lb. sulphur per ton fruit. 6 hours exposure.
Night sulphuring	...	6 lb. sulphur per ton fruit. 12 hours exposure.

Type (B) Sulphur House (Permeable).

The degree of permeability has such an important influence that definite recommendations cannot be made. 8 lb. sulphur per ton fruit, with five hours' exposure during the day and up to fifteen hours' exposure overnight, should not leave an excess of sulphur dioxide in the fruit.

Pears.

Pears are picked green and allowed to ripen after picking. As pears do not readily absorb sulphur dioxide, considerably longer exposure and more sulphur are required to obtain a satisfactory product.

TYPE (A) SULPHUR HOUSE (AIRTIGHT).

10-12 lb. sulphur per ton fruit.
Up to 24 hours exposure.

TYPE (B) SULPHUR HOUSE (PERMEABLE).

No data are available for this type of house, but the recommendations for type (a) house could probably be exceeded.

Reference should be made to the previous article for some general considerations of the sulphuring process. As has already been mentioned, the experiments conducted cannot be regarded as satisfactory nor exhaustive, but the recommendations given should serve as a safe guide to growers until more exact data can be obtained.

APPENDIX.

TABLE (1).—PEACHES—TYPE (*a*)—SULPHUR HOUSE (AIRTIGHT).

Cubical Contents of House.	Weight of Charge Green Fruit.	Sulphur Burnt.	Sulphur per ton Green Fruit.	Sulphur per 100 cub. ft. of House.	Exposure Hours.	SO_2 Grains per lb.	Remarks.
cub. ft.	lb.	lb.	lb.	lb.			
225	1,600	3	4⅛	1·33	7½ (day)	13·5	(1)
225	1,600	3	4⅛	1·33	11 (night)	13·2	(1)
216	910	5¾	14	2·66	17½ „	13·5	(2)

TABLE (2).—PEACHES—TYPE (*b*)—SULPHUR HOUSE (PERMEABLE).

84	900	4	10	4·76	5 (day)	10·1	
84	900	2	4½	2·38	6 „	12·5	
84	900	4	10	4·76	15 (night)	12·1	
98	1,020	3	6½	3·06	6 (day)	8·6	
98	1,020	3	6½	3·06	15½ (night)	11·4	

TABLE (3).—PEARS—TYPE (*a*)—SULPHUR HOUSE (AIRTIGHT).

216	1,450	10	15½	4·53	17⅓ (over night)	13·8	
216	1,450	10	15½	4·53	24	13·4	(3)
216	1,450	8	12⅓	3·70	18	11·5	
182	1,520	10	14½	5·50	18	8·5	(4)
182	1,520	12	17⅓	6·59	18	10·6	(4)

(1) Particularly airtight—of mud bricks.
(2) Fruit fairly green—house only half full, and leaking rather badly.
(3) Owing to leaks in house longer exposure did not increase SO_2 content.
(4) This house was leaking badly, and was almost equivalent to a permeable house.

EXPORT OF GRAPES.

Successful Trial Shipment.

A report received recently by the Minister of Agriculture, Mr. Slater, from the Agent-General for Victoria states that the experimental shipment of grapes forwarded to England by the Department of Agriculture during the grape season arrived there in excellent condition. Subsequently, representative cases from this shipment were forwarded to Dr. Butler, of the Imperial Bureau of Mycology, England, with the

object of having the grapes examined for moulds, condition of berries and stems, and keeping qualities after removal from the ship.

In his report, Dr. Butler states that the grapes were in splendid condition, there being hardly a trace of mould. On being hung up in a dry room the grapes maintained their condition for some weeks. No appreciable difference was found between the grapes packed in granulated cork and those wrapped in sulphite paper and embedded in wood-wool. In the case of the grapes from Merbein and Woorinen it was noticed that the stems were beginning to dry out, while the Shepparton grapes still maintained the greenness of the stems.

Officers of the Department of Agriculture consider the success of this and last season's shipments to be due primarily to the extra careful handling received by the grapes. In this connexion it is pointed out that bruised or split berries are certain to go mouldy, thus damaging the rest of the grapes in the case. Another important factor was the selection of the bunches. Large bunches, free from blemishes are required. These should be cut with the stems as long as possible. The longer the stems are cut, the longer will they maintain their greenness. When the stems dry out, the berries readily lose their firm attachment, and allow moulds to enter. In regard to packing, it is pointed out that the bunches should be carefully handled, making a firm pack. It is advisable to place only one layer of bunches in the box. The bunches may be packed in very dry and clean granulated cork, or they may be wrapped in sulphite paper and embedded in wood-wool. They should be packed as soon as possible after picking, and then forwarded promptly for cooling, after which they may be forwarded to the boat.

So far only the Ohanez variety has been shipped from Victoria to England, but local trials show that superior varieties such as Emperor, Purple Cornichon, Gianette, Waltham Cross, and Henah will keep in cool storage for periods of some three months. It is believed that, if exported successfully, such varieties would command higher prices than those received for the Ohanez grapes. In the last shipment these brought an average price of 15s. 4d. per three-quarter bushel case. It was stated by brokers that this price undoubtedly would have been higher had the parcel been larger.

A further report on the same shipment was received from Mr. J. Barker of the Cambridge Low Temperature Research Station. This report was as follows:—

Merbein Grapes.

The grapes from all three growers were in sound condition, apart from a little mould on the stalks, and the presence of one or two squashed berries in a few bunches in each box. An examination of part of the contents of cases containing treated and untreated cork from each of the three growers revealed no significant difference in the condition of the grapes. An examination of the whole of the contents of cases 31 and 5 from Mr. Thompson, containing treated and untreated cork respectively, showed that, although many bunches of grapes in the two were in similar condition, there was on the whole less mould on the stalks of the grapes packed in the treated cork.

The above remarks indicate the very slight difference to be observed in the condition of grapes packed in treated and untreated cork. It should be realized that the amount of mould present on the stalks of

the grapes at the examination in the agent's warehouse was extremely small, and would not affect the value of the grapes.

To find out whether cork treatment had any effect on the subsequent wastage, half the contents of the above boxes (31 and 5) from Mr. Thompson were repacked in the original cork, the other half being kept on trays in a damp atmosphere. Examinations of these grapes during the following three weeks, both as regards amount of mould on the stalks, and the proportion of mouldy berries, showed no significant difference between the two boxes of grapes.

Woorinen Grapes.

These grapes were not in such a sound condition as the Merbein samples. They were of a dull yellow colour, and each bunch contained five or more squashed or mouldy grapes. The bunches were slightly damp, and mould was present on the stalks, which were often soft. The grapes were not attached to the stalks as firmly as in the Merbein samples.

No difference in condition was observed between the sulphured and the non-sulphured grapes.

The relatively greater wastage in the Woorinen grapes may be related to the fact that these grapes were considerably riper, as judged both by colour and taste, than the Merbein sample. In view of this wastage, it would be of interest to know whether the cork used in packing the Woorinen cases was treated or untreated.

Since the wastage in the Merbein cases was practically negligible for both treated and untreated cork, the experiment provides no evidence as to the advantage of the treatment. It is thus unfortunate that Woorinen grapes were not packed in both treated and untreated cork.

GREEN FEED FOR POULTRY.

I would again emphasize the importance of losing no time in making every possible provision for the growing of ample green material. No flock can possibly thrive without it, and this applies especially to growing chickens. An abundance of green feed not only greatly assists in keeping the birds in a healthy state, but in addition it reduces the grain account. It is common for both growing and adult stock to go off their grain ration when hot-weather conditions prevail but rarely if ever they will refuse succulent green material. Where possible a variety of green feed should be provided, as birds of all ages are apt to tire of any one particular kind when it is fed in surfeit. For example, I have seen flocks of poultry absolutely refuse to eat silver-beet, as they had received nothing else as green feed for months previously. Finely chaffed succulent grass, lucerne, clover, and green oats are ideal green foods for poultry, while any of the brassicas (cabbage family), lettuce, or silver-beet will be much relished.

SHEEP DIPPING.

Provisions of the Act.

In a statement issued a few days ago by the Chief Veterinary Inspector of the Department of Agriculture (Mr. E. A. Kendall), the attention of farmers and graziers was drawn to the provisions of the Sheep Dipping Act, and the necessity for complying with those provisions if prosecution is to be avoided. Mr. Kendall points out that the object of the Act is to prevent the spread of sheep ticks and lice. To effect that purpose it is provided that every sheep-owner must dip all his sheep immediately after shearing and direct from the shearing boards. All lambs must be dipped at the same time. If this is not convenient the sheep must be kept in a securely fenced paddock and dipped within 60 days after shearing. Any owner who refuses to satisfy an inspector that his sheep and lambs have been duly dipped is liable to a penalty up to £20. Refusal or neglect to shear sheep and lambs annually (except lambs to be kept as hoggets) renders the owner liable to a similar penalty. Another provision of the Act is that the Chief Veterinary Inspector may order an owner to dip, within fourteen days, a flock in which sheep have been found to be carrying ticks or lice. It is provided also that, within a month after dipping his sheep, every owner shall forward to the Department a return setting out the number of sheep dipped, time of dipping, &c. Special forms for this purpose are obtainable on application to the Department of Agriculture, or to any inspector of stock, or dairy supervisor.

If any person in charge of travelling sheep finds any carrying ticks or lice and unable to travel, he must take them in a conveyance or leave them in the care of some person. They must not be left on any road or the land of any sheep-owner, and must not be abandoned without being killed and either buried, burned or boiled down.

If any sheep or lambs carrying ticks or lice are found by any inspector either travelling, or in any public place, or sale-yard, proceedings may be taken under either the Sheep Dipping Act or the Stock Diseases Act. In the latter case a penalty of up to £100 may be imposed.

The only safe course for sheep-owners having tick or lice infested sheep to avoid possible legal proceedings being taken against them, is to make arrangements to have such sheep kept in securely-fenced paddocks until the next shearing and dipping.

The necessity for seeing that the provisions of the Act are enforced arises because of the protection which must be afforded to sheep-owners who regularly take the necessary precautions. Sale-yards, therefore, must not be used as a clearing house for tick or lice infested sheep, as such a practice nullifies the benefits that this Act undoubtedly confers on sheep-owners.

TWO BASIC FACTS IN FAVOUR OF SILAGE.

The beauty of silo conservation is that you can store an enormously greater quantity of fodder in the same space than is possible with a hay stack, and you are able to conserve the crop while it is heavy, succulent, and digestible. Further, you are able to take a crop just at the right stage and to put it away. Possibly there are men who will say, "We have a district in which there is no frost, and we can go on cutting each day." I will not listen to them for a moment. When you conserve by means of a silo, you conserve food at a stage when it possesses the highest possible food value. There are men who say that they are able to go out each morning and freshly cut sufficient for the day's needs but to do so they have to harness a team, collect tools, have a man ready, and cut the fodder each time with a chaff-cutter. They have to go to that trouble each day, and each day that their crop is standing it is going off. Whereas, to fill your silo means that you concentrate for a week or two and the whole operation is done within that time. The two basic facts in favour of silo conservation are that you conserve your crop at the right stage, and you concentrate the work within a matter of a week or two. You have your food supply convenient to your hand, and in a clean and suitable form.—H. J. Bate at the R.A.S. Animal Husbandry Conference.

SOUTH AFRICA'S UP-TO-DATE COOL STORAGE FRUIT SHEDS.

The cold storage sheds at Cape Town for the cooling of citrus and deciduous fruit before shipment have now been completed and there is space for pre-cooling of 3,500 tons, or rather more than 50,000 boxes of oranges. They are said to be the largest, most convenient, and modern in the world.

The whole of the upper portion of the sheds is for fruit, there being space for the pre-cooling of 3,500 tons, or rather more than 50,000 boxes of oranges. The ground floor will be used for the storing of general cargo—except perhaps when there may be a sudden rush of fruit arrivals—the space being equal to about 2,500 tons. The loading of steamers may now be carried on through all the hatches at the same time.

It is estimated that South Africa will export between 750,000 and 1,000,000 cases of citrus fruit this season.

ESTABLISHMENT OF HONEY GRADING SERVICE BY U.S.A.

The United States Department of Agriculture has placed in its offices in Los Angeles and San Francisco the latest type of honey colour graders for the benefit of the honey industry in California and especially for exporters to foreign countries.

The Department of Commerce is also placing these graders in its offices in London and Hamburg and it is expected that their use by exporters and importers will simplify and expedite foreign trade. These instruments are the latest type, developed after several years' experimentation, and give an exact determination of the colour grade of any sample of honey.

California is one of the leading states with an annual honey production and export.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

SPRAYING.

The peach aphis will now have made its appearance in orchards which were not sprayed with the red oil emulsion in the winter. The tobacco solution will now be required, and this may be sprayed on as strongly as the grower wishes. If possible, a second spraying should be repeated quickly after the first operation, so as to kill any aphides previously protected by the others, or any that may have only been weakened by the first operation.

The time has also arrived when spraying is needful for the prevention of all fungus diseases, such as shothole or scab, black spot, leaf rust, leaf curl, &c. In the case of these pests, "prevention better than cure" is the invariable rule; and to delay beyond the correct period the application of the necessary sprays is to court disaster. For black spot of the apple and pear, the spraying should be performed as soon as the earliest flowers are opening. For shothole and scab the time to spray is before the flower petals expand; and the spraying may be repeated, if necessary, after the fruit has set.

For rust and leaf curl the spray should be applied before any sign of the trouble appears on the foliage; thus, if the fungus were present during the previous season, it will be necessary to spray early to combat it successfully.

The basis of all the successful fungicides is sulphate of copper or bluestone. Bordeaux mixture (a mixture of bluestone, lime, and water, known as the 6.4.40 formula), is used; the materials and quantities being 6 lb. bluestone, 4 lb. lime, and 40 gallons water.

Another spray, and in some locations equally successful in its results as the Bordeaux mixture, is the copper-soda spray, the proportions being 6 lb. bluestone, 8 lb. washing soda, and 40 gallons of water. In each case the materials should be separately dissolved, and then evenly and simultaneously mixed in a third vessel.

It is very urgent that the lime should be thoroughly fresh and quick, otherwise the spray mixtures will give very inferior results. A second necessary point is that the copper sprays should be used as soon as they are made. Where the grower does not wish to make his own spray, there are quite a number of ready-made Bordeaux pastes and Bordeaux mixtures already on the market, which can be used with satisfactory results. In fact, the use of these has become fairly general, and it is not now the practice for growers to make their own sprays.

General.

It is most important that ploughing should be completed as early as possible. In the past, it has very frequently happened that, owing to delaying the ploughing, the orchard and the fruit crop have both suffered very considerably. It is absolutely necessary to cultivate the surface early, to take advantage of the moist surface and consequent easy ploughing; and also to conserve as large an amount of moisture in the soil as possible. The longer the ploughing is delayed, the less amount of moisture is retained in the soil for summer use. Deferred ploughing certainly means dry soil, enfeebled trees, and diminished results. Early ploughing gives exactly opposite results; the earlier the ploughing, the more soil water is conserved.

When the ploughing is completed, the clods should be crushed, and the land harrowed, so that a fine earth mulch may be obtained. The orchard surface should be kept as level as possible, and no irregular ridging or furrows should be allowed.

All cover crops planted to supply humus to the soil should now be ploughed in. If the plants are of a leguminous nature, the best time to plough these in is when they are in full flower. If the growth has been at all excessive or rank, the crop may be rolled before ploughing; or it may be cut or mowed with a mowing machine. Every care should be taken that the plants should be distributed evenly over the ground, and large quantities in a mass should not be ploughed under. Artificial and stable manures may also be given to the trees at this time. These should be applied before ploughing.

Grafting.

The work of grafting should be completed early in the month. The most useful method of re-working old trees is to cut the head right off, leaving only the stump. Then grafts can be put in according to the

fancy of the grower. The old method of cleft grafting has been superseded by the bark or crown graft. The latter method does not cause any damage to the wood and thus, with care, no rotting can take place. The best method of bark grafting is the saddle graft; that is, the graft is inserted in the bark and a strip of bark is carried right across the trunk and inserted in the bark on the opposite side. This method is much slower than the ordinary bark graft, but it insures a much quicker healing over the old stump.

The Vegetable Garden.

The vegetable plots should be cleaned from all weeds, having the light weeds dug in and the stronger ones pulled out and rotted in the compost heap. The surface should be worked up to a very fine tilth after digging; it must be kept constantly loose with the hoe to keep the soil cool; and prior to digging it will be advantageous to give a top dressing of lime.

If the weather be dry or windy, all newly-planted plants should be frequently watered. In transplanting seedlings, it is a help to dip the whole plant in water before planting.

Any seedlings that are ready may be planted out; the first crop of tomato plants may be planted out under shelter until the frosts are over. At the end of the month a sowing of French bean seeds may be made. Seeds of peas, broad beans, and beet, cabbage, kohl-rabi, and radish, turnip, cauliflower, lettuce, carrot, parsnip, &c., may be sown in the open. Seeds of melons, cucumbers, pumpkins, marrows, and similar plants may be planted in frames for transplanting after the frosts have gone.

The Flower Garden.

After digging the surface must be kept constantly stirred with the hoe, so as to have it loose and friable for cooling and for moisture-conserving purposes. All weeds must be kept down, as they are robbers of plant food and moisture at this season of the year. Shrubs of all kinds may still be planted out, and these should be well watered after planting. Rose and other aphides must be watched for, and sprayed when they appear with a nicotine spray. Rose scale should be sprayed with lime sulphur wash or with kerosene emulsion. This pest will soon disappear if the bushes are kept open to admit air and the sunlight freely. Rose mildew will now be appearing, and the plants, as well as the soil, should be sprinkled with liberal dustings of sulphur. Sulphide of potassium is also a good specific for this fungus trouble, using it at the rate of 1 oz. to 3 gallons of water.

Cannas, early chrysanthemums, and early dahlia tubers may be planted out, as well as all kinds of herbaceous plants, such as delphiniums, perennial phlox, asters, &c. These clumps should be well broken up, and in planting they should be fed with a liberal quantity of stable manure. Beds should be prepared and well dug over for exhibition chrysanthemums and dahlias.

REMINDERS FOR OCTOBER.

LIVE STOCK.

HORSES.—Continue to feed stabled horses well, add a ration of green-stuff. Rug at night. Continue hay or straw, chaffed or whole, to grass-fed horses. Feed old or badly-conditioned horses liberally. If too fat, mares due to foal shortly should be put on poorer pasture. Mares with foals at foot should receive a good ration of oats daily. Those intended for breeding, if not already stinted, should be put to the horse. Colts not intended to be kept as stallions should be gelded. Working horses due for a spell should be turned out to grass.

CATTLE.—Except on rare occasions, rugs may now be used on cows at night only. Continue giving hay or straw, if possible, to counteract the effect of green grass. Be prepared for milk fever. Leaflet on the subject is obtainable from the Department of Agriculture. Give calves a dry shed and a good grass run. Continue giving milk at blood heat to calves. Be careful to keep utensils clean, or diarrhœa will result. Do not give too much milk at a time for the same reason. Feed regularly with regard to quantity and time. Give a cup of limewater in the milk to each calf, also place crushed oats or lucerne hay in a trough so that they can eat at will.

Sow maize for summer feeding and ensilage, also Japanese millet for grazing during dry summer months. Mow surplus grass for hay. If cut when the grass or trefoils are in bloom, grass hay will be as good fodder as any cerial hay. If top-dressed with phosphatic or farm yard manure, good returns will be obtained from grass hay; it has also the great advantage that mice will not work in it. Cut 1 acre for each cow in the herd; it will keep until the next drought if protected from the weather.

PIGS.—Supply plenty of bedding in warm, well-ventilated styes. Keep styes clean and dry, and feeding troughs clean and wholesome. Sows suckling young should be well fed to enable them to produce plenty of milk; about 2 lb. grain mixture for the sow, and 1 lb. for each young one being suckled. Give young pigs grain mixture and skim milk in separate trough as soon as they will take it, and keep them fattening from the start to get them off as early as possible. Give a tablespoonful of bone meal, or half that amount of mineral phosphate, per 100 lbs. live weight in food daily. If pigs are lousy dress them with kerosene emulsion or sulphur and lard, rubbing well into the crevices of skin, and disinfect styes. Pig breeding and feeding should be very profitable for a long time to come, and it should be safe to launch out now.

SHEEP.—Shear as early as the weather will permit, and avoid the usual excessive dust in travelling to, and yarding at sheds. Burr and seeds also collect on the fleeces if shearing be left until late in the season, particularly with lambs. Shear all lambs intended to be held over—they thrive better and make more growth through the ensuing summer and autumn. Fleeces from well-bred sheep should be skirted with care, the better the class of wool the greater the necessity. From fleeces that have become dry and earthy on the backs, remove only the merest stains; there is little advantage in skirting these. It is better management to have ample table space, and extra hands skirting closely, than to hastily tear off unnecessary wool and then employ men at other tables to sort "broken fleece," "first," and "second" pieces, &c. All stains must be removed from ewes' fleeces, and pizzle stains from the bellies of wethers. Keep separate all coarse fleeces from the finer sorts, and in merinos the yellow and mushy from the shafty and bright. Skirt all hairy thighs from crossbred fleeces. Avoid sending wool to market in long, round-sided bales, known as "sew-downs." Press in a box-press, forming square sides. Brand bales neatly, on one side only, and not with sheep-branding oil, tar, or paint. Stencil plates and branding ink can be obtained on application to the respective brokers.

POULTRY.—The bulk of incubation should cease this month—late chickens are not profitable. Devote attention to the chickens already hatched; avoid overcrowding. Feed with dry mash. Also add plenty of green food to ration,

ordinary feeding to be part pollard, 1 part bran, and a little dried milk, animal food after the first fortnight. Feed ground grain, such as wheat, hulled oats, maize, and peas, which should be fed in hopper to avoid waste. Grit or coarse sand should be available at all times. Variety of food is important in growing chicks; insect life aids growth. Remove brooders to new ground as often as possible; tainted ground will retard development.

CULTIVATION.

Farm.—Plant main crops of potatoes in early districts and prepare land for main crop in late districts. Work fallows. Sow maize and millets where frosts are not late, also mangolds, beet, carrots, and turnips. Sow tobacco beds and keep covered with straw or hessian.

Orchard.—Ploughing and cultivating to be continued, bringing surface to a good tilth, and suppressing all weeds. Spray with nicotine solution for peach aphis, with Bordeaux mixture for black spot of apple and pear, and with arsenate of lead for codlin moth in early districts.

Vegetable Garden.—Sow seeds of carrot, turnip, parsnip, cabbage, peas, French beans, tomato, celery, radish, marrow, and pumpkins. Plant out seedlings from former sowings. Keep the surface well pulverized.

Flower Garden.—Keep the weeds down and the soil open by continued hoeing. Plant out delphiniums, chrysanthemums, salvia, early dahlias, &c. Prepare ground for digging and manuring for autumn dahlias. Plant gladioli tubers and seeds of tender annuals. Spray roses for aphis and mildew.

Vineyard.—This is the best month for field grafting. If stocks bleed too copiously, cut off a day or two before grafting. Make sure that scions are fresh. Placing butts in clean water for a day before grafting is recommended. Field grafts *must* be staked, to avoid subsequent straining by wind and to ensure straight stem for future vine. Stakes are also necessary for grafted rootlings for same reasons. Temporary stakes 3 feet long will suffice. Disbud and tie up vines, giving special care to young plantations. Beware of spring frosts. Keep a sharp look out for cut worms. (Bulletins on both subjects will be posted on application.)

Conclude spring cultivation (second ploughing or scarifying and digging or hoeing round vines). Weeds must be mastered and whole surface got into good tilth. Sulphur vines when shoots 4 to 6 inches long.

Varieties liable to black spot should be sprayed early (when shoots are a couple of inches long) with Bordeaux or copper soda—repeated sprayings will be necessary should the spring prove a wet one. (Bulletins on black spot will be posted on application.)

During October, spraying for protection against Downy Mildew *must* receive attention. A first or preliminary spraying should be given when the young bunches are *at their maximum visibility*. This varies with the season; it is usually in the first half of October. Subsequent sprayings will be necessary in a showery Spring. See Bulletin No. 49; available on application.

Cellar.—Taste all young wine; beware of dangerous symptoms in unfortified fruity wines, which may need treatment. Fill up regularly all unfortified wines.

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Lucerne

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FINEST STRAIN

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Dear Sirs,

As promised, am enclosing returns from the three cuts of Lucerne—taken from the yearling stand of 30 acres grown from your re-machine cleaned "Pilca-Butta" Hunter River Lucerne Seed.

FIRST CUT equalled 37 tons Lucerne Hay, brought £8/5/- per ton.

36 bags of prime seed off **SECOND CUT.**

THIRD CUT gave 15 tons of beautiful Lucerne chaff, full of leaf. **This Lucerne chaff topped the Sydney market.** This was the third and final cut for the season. A drought year and no irrigation —a triumph for your "Pilca-Butta" Lucerne Seed.

Results speak for themselves. You may keep originals and use as you think fit.

Taking into consideration that these returns were taken off a **yearling crop** and **not irrigated** on a drought year—this must be nearly a record.

Yours faithfully,
E. J. WATSON.

(Note.—We hold original account sales as submitted by Mr. E. J. Watson.)

PRICE—2/9 lb., in sealed bags, guarantee attached; 28-lb. lots or more, **2/7** lb.; ½-cwt. lots or more, **2/6** lb.; 3-cwt. lots or more, **2/4** lb. Special price large quantities.

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I have been using "* * * *" Kerosene for about twelve months—my next order will be "Cross."

(*Signed*) N. W. JERICHO.

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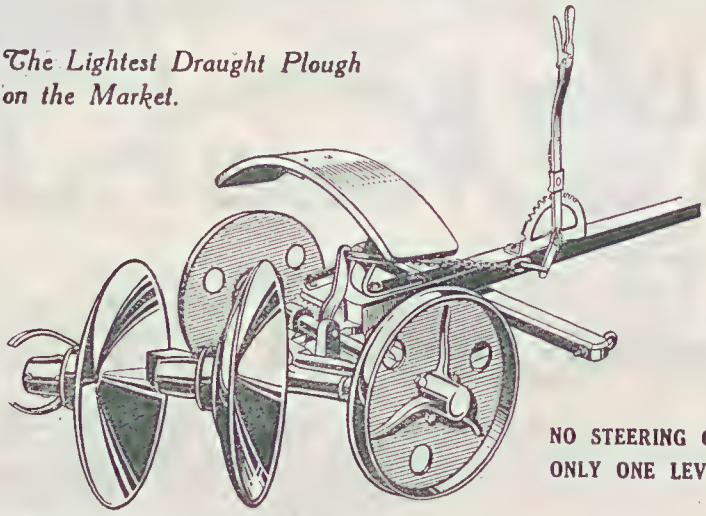

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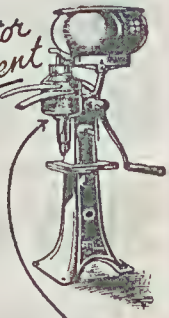

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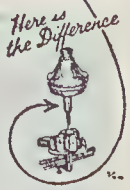

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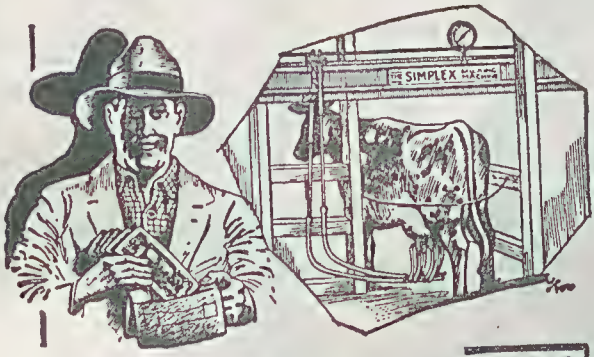
TRADE IN YOUR OLD SEPARATOR. Write us for Catalogue S 200. Please state number of cows you are milking.



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It's a real money-earner—cuts down milking costs, and puts pounds in my pockets every week." Hygienic—Simple—Durable—and cannot possibly injure the cows. Start paying yourself wages this season. Write us for Catalogue M 200, also for Catalogues of

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for LIGHT work, LIGHTNING work, & LIGHTENING work

THE MUNRO Lightning Wool Press is soundly constructed on very heavy and solid base plates; only the best quality timber is used throughout. The Bottom Box is so constructed that it can be operated with the utmost ease and the greatest rapidity. Both boxes are strongly built with angle steel-supporting frames, giving extra strength and rigidity wherever necessary. **The boxes are of a size which allows the use of standard bales without stretching, and yet which will fill properly.** The Winding Gear and Ropes are easily adjusted and the Pressing can be done with the utmost ease, permitting great labour-savings and reducing the exertion of the operator. All the gears are exceptionally strong and are constructed to withstand rough usage. The ropes are of the best quality flexible steel wire with a hemp core, and strong enough to press the heaviest bales the Press will take.

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Interest 6 per cent.

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THE two following Summer Fodder Crops are well-known to most farmers. Planting should be made at once so that the crop may become established before the hot summer season comes on.

SUDAN GRASS

This fodder crop is yearly being more widely grown. Though the growth is a little slow at first, when once the plants become established it is exceptionally drought-resistant, very palatable to stock, and a tremendously heavy yielder. Its feeding value compares favorably with wheaten or lucerne hay, it stools into as many as forty and fifty stalks, and shoots up again in a miraculous manner after being fed off.

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Perhaps the quickest growing of the green fodder crops. It "comes again" with amazing vigor after being fed off. Sow 10 lbs. per acre in drills, or 20 lbs. broadcast.

CABBAGES & CAULIFLOWERS

In a few weeks growers will commence planting Cabbage and Cauliflower Seed to raise plants for the new season. We are noted for our strains of these lines, and regular growers have long since proved their superiority.

Before Planting write for YATES' Current Price List of Farm and Market Garden Seeds

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DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter *fat* yielded. Thus a calf from a cow with a 400 lb. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves *ex* heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

SIRES IN USE:

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).
Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lb.; 1917, 398 lb.; 1918, 419 lb.; 1919, 479 lb.; 1920, 428 lb.; 1921, 562 lb.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lb. milk.						
Dam's Dam's	,,	14533 lb. milk	...	4 years average	12871 lb. milk.	
Sire's Dam's	,,	10370	,,	... 7 ,, ,,	9354	,,
Sire's D. Dam's	,,	9510	,,	... 12 ,, ,,	8033	,,
G. Sire's D. Dam's	,,	10215	,,	... 7 ,, ,,	9386	,,
G.G. Sire's D. Dam's	,,	12565	,,	... 10 ,, ,,	8853	,,
G.G.G. Sire's D. Dam's	,,	10088	,,	... 2 ,, ,,	9754	,,

BIT O' 'BACCA (Vol. 3)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Nictitana (311 B.) by Nicotine (69 A.A.).
Nictitana's butter fat records for 6 successive lactation periods are as follow:—1918, 450 lb.; 1919, 396 lb.; 1920, 393 lb.; 1921, 465 lb.; 1922, 524 lb.; 1923, 536 lb.

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

Application for purchase to

Dr. S. S. CAMERON, DIRECTOR OF AGRICULTURE, MELBOURNE.

Cletrac Tractors

Famous "SNAP" Oiling System

On Model "K" Cletracs

Use 20-30 Cletrac

SNAP Lubrication is exactly what the name implies—a real Snap! One push of the Plunger (shown above) and—Presto! all of the lower track wheel bearings are instantly and thoroughly oiled.

There is no "time out"—not even a minute wasted, for Cletrac "K" can be oiled without even stopping the machine.

CLETRAC'S "SNAP" OILING SYSTEM has the distinct advantage of forcing fresh oil into and around the moving parts, and forcing the old oil out, and without any contact with dust and grit.

EXTRACT from letter received from Mr. Kobolke, of Gilderoy, Vic.—My two sons have been working it on a 3-furrow Mackay stump-jump disc plough in very rough, hilly country, where no other type of tractor could possibly operate.

My land is full of stump holes 5 to 6 feet in diameter, and if any other breed of tractor got into them it would never get out.

We recently did some rather interesting work ploughing a paddock in which the bracken was 3 to 4 feet high. We ploughed it all under in the first operation, and then finished the job with a 16-disc cultivator with a roller hitched on behind.

Sawing hard messmate with a 42-inch circular saw is another job, and the machine has never yet been pulled up.

I can thoroughly recommend the Cletrac, and I have had innumerable applications from my neighbours to do contract ploughing, but am too busy with my own work to consider same.

Traction Australia Pty Ltd.

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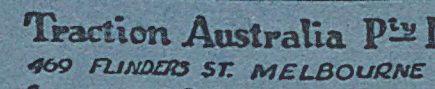

Cletrac Tractors

S
630
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